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Essays on the Effects of Flexibility on Labour Market Outcome

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2. ISAE Monitoring Italy 2007 - Rome - Italy
   Work arrangements and firm innovativeness: is there any relationship?
3. EARIE CONFERENCE 2007 - Valencia - Spain
   Work arrangements and firm innovativeness: is there any relationship?

Abstract

The thesis is structured in three articles which develop an analysis focused on the effects of labour market regulation on the labour market outcome and country economic performance.

The first paper makes a review of literature by supporting the "OECD-IMF orthodoxy" according to which the rigidities imposed by labour market institutions are crucial determinants to explain European unemployment. Many works have been published which support this view. While these studies have become increasingly complex, the empirical results do not appear to be robust since they are highly sensitive to the nature of variables, the time period, and the econometric methods applied. Various reasons explain the adherence to this orthodoxy: the existence of priors, poor data on labour market institutions, as well as unsuitable econometric techniques. Considering that additional cross-country analysis will not be decisive to improve our understanding of labour market institutions, this paper suggests new investigations which rely on time-series-cross-section (TSCS) techniques, micro-analysis of firms and workers, as well as human subject and artificial experiments.

The second paper delves into the relationship existing between labour market flexibility - epitomized by the proportion of temporary and part-time workers - and companies' ability to innovate - as measured by the percentage of new products in total sales. Even though it is an important issue affecting a country economic growth, the analysis of the flexibility effects on companies' innovativeness is almost neglected in current literature. On the one hand, 'more flexibility' (i.e. a higher labour turnover) might foster firms' innovation potential. Beside having (potential) wage savings effects, a larger inflow of

new staff may enrich the pool of companies' innovative ideas. On the other hand, greater work flexibility may have some drawbacks: steadily high rates of people entering and leaving firms may reduce social cohesion and trust, as well as increase the probability of opportunistic behaviour. Results suggest that a higher percentage of internal flexibility is associated with greater propensity to innovate, especially in high-tech firms. In line with the 1999/70/EC European directive, these results also suggest that fixed-term contracts (external flexibility) might be useful in periods of extraordinary corporate activity, but can have disadvantages for firms innovativeness and productivity if improperly used during normal activity.

Finally, the third paper refers to one of the most attractive model for policymakers in Europe: the flexicurity model that combines elements of flexibility in labour markets with income and employment security for workers. Although common principles might drive labour market reforms, flexicurity should take up different forms from country to country. The aim of this work is investigate which is the suitable pathway for Italy and identify the advantages and risks of adopting flexicurity policies. In the first part, the paper examines flexicurity in Denmark, one of the leading country in this field, and then focuses on Italian labour market only. In particular, on the basis of an experimental analysis, the second part investigates the possibility for Italy to follow the first European flexicurity pathway which - in the case of countries with segmented labour markets - suggests to rely on contractual arrangements to distribute flexibility and security more evenly across the workforce. Unlike other experimental analysis, in this case the level of unemployment is determined endogenously and the level of efforts made is observable with a certain degree of uncertainty. This feature allows to study the interactions of labour market regulation and firms' employment policy in determining the unemployment level. Results suggest that - especially in countries

such as Italy, where there is limited scope for increasing spending - these contractual arrangements can improve the situation both for workers and companies.

Chapter 1

Beyond the OECD-IMF orthodoxy

Abstract

The central message of the OECD Job Study (1994) and the IMF report (1997) is that the rigidities imposed by labour market institutions and policies are crucial determinants in the explanation of the European unemployment. In recent years, many works have been published supporting this view, also known as the "OECD-IMF orthodoxy". This article evaluates the literature for this labour market rigidity to see whether the available evidence provides empirical support for the labour market rigidity explanation. While these studies have become increasingly complex, the actual empirical results appear not robust since they are highly sensitive to the nature of variables, the time period, and the econometric methods applied. Different reasons explain the adherence to this orthodoxy: the existence of priors, poor data on labour market institutions, as well as unsuitable econometric techniques.

To improve our understanding of labour market institutions, additional studies making cross-country comparisons will not be decisive. This paper proposes instead new investigations which rely on highly sophisticated TSCS techniques, micro-analysis of firms and workers, as well as human subject and artificial experiments.

"The true is that it exists an optimum in the degree of flexibility, which does not coincide with its maximum at all" [P. Sylos Labini]

1.1 Introduction

Nowadays, deregulating markets seems the only feasible way to obtain fulfilling economic performance. But are light institutions, along with wage and flexible labour arrangements the right track to succeed? In spite of decades of empirical and theoretical analysis, a widely shared view does not exit.

On the one hand, there are economists, international agencies and policy-makers who support the view that institutions are the cause of economic distress and poor performance. The OECD study of 1994 is a case in point (*Jobs Study*). In this work, in order to improve country economic performance, four factors linked to the labour market deregulation were indicated among others[1]: increasing the flexibility of labour working time schedules; making labour wages and costs more flexible; changing unemployment benefits; reforming labour protections. Conversely, a fifth factor considers a direct and active intervention in the market, by means of training activities, assistance in looking for a job and incentives to hire long-term unemployed people. The same view is shared by the IMF (1997,

[1] In order to improve the countries' economic performance, ten factors were identified: good macroeconomic policies; dissemination of technical knowledge; removing obstacles for the emergence of new enterprises; improving education and training; increasing competition in the product markets. See OECD (1994a).

2003a) which few years later maintained that institutions could be obstacles to economic efficiency.[2]

The ILO has an opposite view. According to this organisation, and in line with the analysis proposed by Coase (1960), the existence of labour market institutions, and bargaining between actors should be able to produce the optimal allocation of resources and - as long as transaction costs are not excessive - a redistribution of income to workers' benefit, without affecting economic efficiency (Freeman (2005)). Similarly, in 2003 also the World Bank published a book reporting that high unionization rates at macroeconomic level lead to lower wage inequalities and can improve economic performance. Various authors also showed that policy can address labour market imperfections, such as difficulties in matching demand and supply, and can also foster efficient labour reallocation and consumption smoothing in the presence of financial and other market imperfections (Bertola (2004); MacLeod and Nakavachara (2007); Wasmer (2006)).

Despite a growing number of economists and agencies who question the 'OECD-IMF' view, however, most studies on labour market institutions conclude - to various extents - that evidence supports this orthodoxy, which means that institutions did matter in determining the unemployment pattern in the period from the 1960s to the 1990s.

Hence what explains the strict adherence to the 'OECD-IMF' orthodoxy and such an inconclusive debate? As argued by Freeman (2005), there are two main reasons. The first reason is that many advocates hold strong priors that the labour market operates almost perfectly without institutions. Consequently, we are in a situation in which researchers' expectations are

[2]The disagreement which is recorded when studying the effects of institutions on the unemployment rate does not exist when explaining the effects on income distribution. It is widely recognized that the presence of these institutions - trade unions, in particular - reduce income inequality.

affected by their ex-ante knowledge, and both the choice of models and interpretation of results might be driven by these beliefs. For example, in some cases, this has lead researchers to interpret simple correlation as causal relationships.

The second reason is that cross-country aggregate data used in these analyses is too weak to decisively accept or reject the orthodox view. In this regard, emphasis must be laid on the comprehensive survey provided by the recent work of Baker et al. (2005). These authors observed that almost all the works examining the relationship between unemployment and labour market institutions are too sensitive to model specifications and variable definitions, thus providing different and diverging results. Even if we only focused on the aspects of these studies which appear more sound, the range of coefficient estimations would be striking. For example, for a 10% tax increase, studies report a 0.9% increase in the unemployment rate, whereas other studies report a 2.1% increase (Elmeskov et al. (1998), Nickell (1997)); extending the length of unemployment benefit by one year makes the unemployment rate rise to about 0.7-1.4% (Nickell (1997), Bertola (2005)). However, if we considered the results related to other more sensitive variables - such as firing costs - estimates would appear even more varied. Although we can explain these differences as a result of the way in which variables were constructed, the indications arising from these studies remain uncertain and the potential benefits which could be provided by these policies turn out to be rather blurred. In addition, even though the *Job Study* of 1994 recognized that active labour policies are factors which reduce unemployment, there is the tendency to neglect the explanatory power of the variables representing these "good institutions". In fact, in most studies, the coefficient regarding the variables representing active policies resulted significant and negative.

Hence, shall we conclude that the attempt to understand the

effects of labour market institutions is a mission impossible? What can we do in order to find a rational explanation of these effects? Which indications can we infer from the theoretical analysis?

As suggested by Freeman (2005), additional studies using aggregate data and making cross-country comparisons will not settle this debate as they will all share these weaknesses. A step forward is represented by the empirical micro-analysis of companies, workers and unions, along with agent simulations and market experiments. Studies on firms whose organization is rather complex or experimental economics may offer insights on the way in which institutions work at a higher level and on the conditions under which institutions may have positive or negative effects on economic performance.

The aim of this work is provide a review of the studies on labour market institutions and their impact on unemployment and economic performance. As literature is wide, an attempt is made to group the most influential works in relation to their main model specifications, by also trying to provide a flavour of their evolution over time. Specific attention will also be paid to the dataset and econometric techniques used in these works. One of the main concerns related to the dataset on institutions and labour arrangements is that the series are fairly poor compared to other economic variables. In order to study labour market institutions, it is worth relying on tricks available for time-series-cross-section techniques, which are similar to panel dataset where the dimension is rather high. With a view to providing a complete picture, this paper also briefly review the major works on unemployment entry and exit flows. Finally, and in keeping with the argument proposed by Freeman, it presents the results from recent works on experimental labour economics and labour market microanalysis which investigate different, crucial labour market institutions.

This paper is structured as follows: the next section briefly reviews the main issues related to theoretical and empirical cross-country studies, which investigate the role of labour institutions in their interactions with macroeconomic shocks, product/financial markets and other labour institutions. It also examines the consequences of looking to the labour market dynamics. Section 3 analyses the main concerns related to the dataset generally used in cross-country analysis of labour market institutions, as well as the advantages related to time-series-cross-section (TSCS) techniques. Finally, section 4 stresses the possibility of creating new data by means of experiments and simulations with artificial agents. Conclusions are drawn in the final section.

1.2 Theory and evidence

Even though there exist many theoretical positions to explain long-term unemployment, basically there are two streams of analysis: models based on *flows* (i.e, Pissarides (2000)) and models based on *stocks* (Bertola and Koeniger (2007); Nickell et al. (2005)). While neglecting other aspects, the following conclusions can be broadly drawn. Firstly, both in the short and long term, the level of unemployment must be consistent with the level of real demand. Secondly, in the long run, demand and unemployment reach their equilibrium level, in which inflation is stable. Finally, the unemployment equilibrium level is affected by every factor capable of affecting the way in which people, who are looking for a job, can fill vacancies (*matching*) or - in other words - reduce labour market frictions. These factors take up the form of labour market institutions (Nickell et al. (2005)).

The need to consider all these factors when turning these predictions into empirical models makes the researcher's quite de-

manding. Which variables must a researcher use in order to grasp and explain the functioning of the various institutions? How is it possible to separate the factors which affect long-term unemployment from the factors which affect it in the short term? How can we capture the effects of the various shocks which hit the economy?[3].

1.2.1 Analysing interactions between labour market institutions and macroeconomic shocks

Irrespective of the indicators that the researcher has chosen to include in regressions, institutions alone cannot explain the unemployment rate trend. Many other factor must be considered to reach a better understanding of the phenomenon. As Blanchard and Wolfers (2000) suggested, in order to explain the unemployment trend in OECD countries it is important to study interactions between different institutions and macroeconomic shocks.

These authors point out that unemployment rates show a positive trend which is very different from country to country. As most institutions have always been there, even in a period of low unemployment, they argue that the huge heterogeneity in institutions could explain different levels of real unemployment, but not its evolution over time. This is the reason why in their analyses these authors introduce interactions between macroeconomic shocks and labour market institutions[4]. Theoretically, these shocks - while interacting with institutions - could explain both the positive trend and the heterogeneous movements in

[3]Factors, or shocksand short-term unemployment, as well as the factors affecting aggregate demand, productivity and wages, i.e. shocks in the money supply or in interest rates. See Nickell (1997)

[4]The shocks they consider are the following: interest rates, the severance pay (TFP) growth rate and the factors which shift labour demand. According to Nickell (1997), disregarding the inflation rate variations, these shocks are not stationary. In a different analysis Blanchard and Wolfers (2000) measures shocks by means of time dummies. The explanatory power of the model improves substantially.

different countries' unemployment rates. The same negative shocks - which lead to an increase of the unemployment rate - could have stronger or weaker, depending on the institutions' absorption ability. More precisely, institutions can affect reactions to shocks in two ways: an impact effect (magnitude) and persistence (length)[5].

In general terms, the following shocks have been considered:

- in the *money supply*, more precisely in factors that cause changes in growth rate of the nominal money supply stock;
- in the *productivity*, as measured by total factors productivity;[6]
- in *labour demand*, as measured by residuals from a basic regression;[7]
- in the *price of imports*, as measured by the variation in the real price of imports weighted by trade shares.
- in the *real interest rate.*[8]

Except for interest rates, these shocks tend to be absorbed quickly (that is, they are mean reverting and stationary).

[5]This explanation is at the core of isteresis theories.

[6]In early 1970s Europe, for example, experienced a sharp decrease in the factor productivity growth. In five countries (France, Germany, Italy, Spain and Great Britain) the rate fell from 5% in the 1960s to 2% in the 1970s. Since then, this rate has levelled off. Similar conclusions can be drawn by looking to the EU-15. See Blanchard and Wolfers (2000).

[7]This kind of shock might account for technical change, for example, labour adverse. Let us think to a standard Cobb-Douglas production function $Y = L^{\alpha}K^{1-\alpha}$. Let $\eta = w/Y_n$ be the rate between salary and labour marginal productivity. The share of labour is $a = \eta * \alpha$. A reduction in the share of labour, a, could reflect both in a reduction in the share of labour in the production function, α, or in a reduction of η. Just to give you an idea, in 2000 the labour share in Europe was 10% lower than in the 1960s for the EU-5 and 8% lower for the EU-15. However, especially in the short run, it could reflect a variation in the price of factors. See Blanchard and Wolfers (2000)

[8]Interest rates affect both short-term and long-term unemployment. Indeed, an interest rate variation will affect the capital accumulation process, thus making labour demand shift. In Europe, for example, interest rates recorded a positive trend in the 1960s and a negative one in the second half of the 1970s, whereas they became strongly positive in the 1980s and 1990s. See Blanchard and Wolfers (2000)

Results from Blanchard and Wolfers (2000)' work suggest that the combination of macroeconomic shocks with labour market rigidity seems to explain the general unemployment rate trend as from 1960 and its variations across countries. However, their results are sensitive to different specifications. For example, results are less robust when considering institutions that varied over time.

In a similar model, Nickell et al. (2005) consider how the change in institutions - interacting with macroeconomic shocks - can explain the unemployment rate deviation from the equilibrium level. In particular, they account for institutions' interactions with macroeconomic shocks. In addition to the lagged dependent variable, the basic model presents the dummies for each country and time period, as well as a specific trend for each country.[9] The model is not very good at explaining data. For these reasons, they also look at a dynamic simulation for each country. The explanatory power of the model improves and it is able to explain 50% of the inflation rate variations. For example, the variation in unemployment benefits and taxes account for two thirds of long-term unemployment rate variations. Their final analysis considers the interaction between institutional variables - represented by their mean in the period - with macroeconomic shocks - represented by means of dummies variables. By themselves, these interactions explain data pretty well. However, when added to the baseline model, their explanatory power decreases significantly. In authors' view, the institution changes are able to explain the unemployment pattern from the 1960s to the 1990s, whereas the interactions between shocks - as measured by dummy variables - and institutions do not contribute significantly to explain unemployment rates across countries.

The choice of Blanchard and Wolfers (2000) seems to be more

[9]See Baker et al. (2005) for a critical assessment of their model.

correct as they measure macroeconomic shocks by means of macroeconomic variables. The use of dummy variables to measure macroeconomic shocks, as in Nickell et al. (2005), could account for an effect which helps to better understand the process (see Baccaro and Rei (2007); Baker et al. (2005)). In addition, when introducing interactions, attention must be paid to the selected variables, as well as interactions, since these choices could influence final results. Further, as the work of Blanchard and Wolfers (2000) shows, the series of labour market institutions are poorer than those available for macroeconomic shocks.

Likewise, Fitoussi et al. (2000) develop a model which uses the interactions between macroeconomic shocks and labour market institutions. Even these authors are strongly convinced that a model using only institutions is not enough to explain different unemployment rate patterns across countries. They present - inter alia - a regression which tests the assumption whereby monetary policy is responsible for the higher unemployment rates recorded in the 1990s. Their model can account only for 40% of the unemployment rate variability.

Conversely, Baccaro and Rei (2007)'s work pays specific attention to the type of data used (time-series-cross-section - TSCS) and, hence, to the various problems which arise while using different datasets (see below). The model starts with one of the most powerful specification for supporting the deregulating view as it was used in the IMF (2003b) work - the study with the strongest empirical evidence. In particular, as in the IMF's work, they consider the role played by monetary authorities. They construct an index representing the central banks' independent role - an unusual approach for this kind of works. A priori it is no clear which sign we can expect for this variable. However, ceteris paribus, once it is considered in its interaction with the degree of centralization in the wage bargaining process, it should be negatively associated with the

unemployment rate.[10] In some specifications, the model contains interactions between each institutional variable and the degree of centralization. The underlying idea is grasp the different ways in which institutions work in relation to different types of capitalism. Furthermore, unlike previous works, they do not include country-specific trend and they do not estimate specific coefficients for few countries.[11] In addition to institutional variables, only the macroeconomic shocks represented by interest rates are considered. No other interactions are taken into account.[12] Results do not confirm the view that, by removing labour market institutions rigidity, unemployment can be reduced. On the contrary, there is strong evidence for the prominent role played by interest rates and central banks' indipendence. The major conclusion which can be drawn from this work is that the unemployment rate is mostly affected by restrictive macroeconomic policies and institutions which lead to these policies.

A different approach is used by Ljungqvist and Sargent (1998). They believe that the consequences on different institutions depend on the fact that the "world" is undergoing a phase of high or low turbulence. In the former case, the unemployment rates could be very different across countries. In fact, it is more likely for unemployed people to lose their skills. Hence, in Europe, where unemployment benefits are higher, it is less likely to find a job with a higher salary than benefits compared to

[10] According to the rational expectation theory, for example, central banks should not directly influence the degree of employment and unemployment. Conversely, authors suggest that central banks' activity could become crucial when there is a centralized wage bargaining process. In this case, authorities could reach their inflation target more easily.

[11] According to Baker et al. (2005), it is not correct to include trends for each countries, because in so doing, we can simply control an effect, without explaining anything. Moreover, the choice to estimate different coefficients for some countries must be avoided once the decision to pool is taken, unless - obviously - there are very good reasons. For example, to distinguish between EU-15 and EU-25 countries.

[12] The choice to rely on five-year data drastically reduces the number of observations available and - hence - the number of parameters which could be estimated.

the United States, where these benefits are lower. In the latter case, in a world of low turbulence, it is less likely for unemployed people to lose their skills and it will be easier to find a job with a salary higher than the reservation wage. In this situation, the divergence between Europe and the United States will decrease. However, as argued by Nickell et al. (2005), this model does not explain why unemployment rate followed so many different trends across European countries.

To recap, in all these works different macroeconomic shocks affect unemployment according to the country institutional framework. Even though these works do not offer insights on causal relationships, and sometimes are even contradicting, by emphasizing the role of interactions between institutions and macroeconomic shocks in econometric specifications, they highlight the ability of different institutional arrangements to absorb and react the shocks which hit the economy. Furthermore they also underline the need to control institutions, such as central banks which - in spite of playing an important role - have often been neglected.

1.2.2 Interactions among labour market institutions

It is equally important to consider how institutions interact one another. Some authors suggest that there is complementarity among reforms. For example, starting from a *wage/price setting* model (WS/PS), it is possible to show how institutions' interactions affect the unemployment rate, through two mechanisms:

- the interaction between factors affecting the slope of the WS/PS curves with those which affect the position of these two curves. For example, a cut in the unemployment benefits (that make the WS shift downwards) will

have a stronger impact: *i*) the flatter the PS is (for example as a result of a milder regulation in the product markets) *ii*) the flatter the WS is (for example, when there is a weaker unions' power) because the feedback effect of higher unemployment rate is lower in terms of higher wages demanded.

- the starting point. Reforms are expected to have greater effects where the employment rate is higher (employment-friendly). In other words, the labour demand marginal effect of a reduction in real wages will be higher where employment is already higher rather than low.

These considerations lead some authors to argue that there exist complementarities and synergies among reforms (i.e.,Fitoussi et al. (1998); Orszag and Snower (1998)), and the effects of all reforms considered in isolation are weaker than the effects of all reforms jointly achieved. Even in these studies, the major problem is related to the interactions to be selected, and particularly the basis on which this decision should rest. Why should we include an interaction and leave aside another. [13] In fact, it is very difficult to consider all interactions because one will soon reach an over-parameterized model. In addition, the fact of considering an interaction instead of another could well explain the experience of an individual country, but not of all the others. As underlined by Bassanini and Ernst (2002), it could be worthwhile to consider interactions in a systemic way, which means grasping the effects on an institution when its entire institutional framework varies. To this end, they create a variable representing the systemic effect by summing up all the possible interactions. The introduction of this variable in their baseline regression affects the direct coefficient of some institutions (for example, the coefficient on the EPL variable become

[13] Step-wise regressions could be a solution but even in this case results may be affected by the choice of variables to be added/removed in the various steps.

significant, as well as the unionization rate). Furthermore, the coefficients on interactions are significant, supporting the view of complementary reforms, and the model well fits data and explains 92% of the unemployment rate variability as against 74% in a model without interactions.

The main conclusion drawn is that a reform package will bring greater benefits than piecemeal reforms - hence it makes little sense to focus only on few specific institutions.

1.2.3 Interactions with product and financial markets

Another aspect that deserves attention is the interaction between labour market institutions and product/financial markets, as recent papers have pointed out.

In their theoretical paper, Blanchard and Giavazzi (2003) investigate how the effect of deregulation in the product markets works together with deregulation in the labour market. In their study, monopolistic competition in product market determines rent whereas the degree of labour market deregulation determines the share of rent which occurs to workers. The main results they get are the following:

- the direct effects of deregulation in product markets reduce the rent. However, workers gain more as consumers as they lose part of the rent. In the long run, deregulation leads to higher real wage and less unemployment;
- the direct effects of labour market deregulation are gains for workers - less unemployment and higher real wages in the long run - but in the short run it is possible to have higher unemployment and lower real wages;
- the deregulation of labour market is feasible when it is accomplished with product market deregulation.The re-

duction in the rent simply reduces the incentive to fight to share it.

Only a few empirical works, however, try to account for these interdependencies. Nicoletti et al. (2000) and Nicoletti and Scarpetta (2005) show the tendency of labour market regulation to go hand in hand with product market regulation. In countries where product markets are highly regulated, such as Italy and Greece, workers tend to be more protected. Moreover, they also find that there exist important complementarities between reforms in product and labour markets. Amable and Gatti (2006) show that engaging in a process of product market deregulation yields an implicit labour market reform, leading to a more intense turnover on the labour market. This mechanism is exacerbated by increased competition on the product market but is dampened by redundancy payments. Similarly, in Amable and Gatti (2004), they develop a dynamic efficiency wage framework where deregulation in product and labour markets boosts labour turnover and reduces job security; this mechanism pushes the incentive compatible real wage schedule upwards and may generate aggregate employment losses. Finally, the work of Griffith et al. (2007) shows that the significant product market deregulation experienced in the 1990s by some OECD countries was associated with an increase in competition and in aggregate employment. They also find that, in countries with higher levels of collective bargaining coverage and/or union density, the increase in employment is more marked. Their results, however, focused on average effects across the whole economy and might be less likely with reforms affecting only a small number of sectors (as individuals might lose both as workers and as consumers).

Recent papers have also pointed out the existence of interactions between labour and financial markets imperfections (Wasmer and Weil (2004); Bertola and Koeniger (2007);Bertola

(2004); Acemoglu et al. (2001)). Some of these studies challenge the standard view by pointing out that in some cases deregulation may give rise to perverse effects on employment. Credit market frictions hinder investment and lower capital stock in the economy which, in turn, lead to a lower employment level if labour and capital are complementary or if labour market imperfections make real wages downward-rigid.

The main insight from this strand of literature is the need to control interdependencies between labour and product/financial markets as, even in this case, there could be important complementarities in reforms.

1.2.4 Dynamic of labour markets

Alternatively, another way to look at labour market institutions is analyse the equilibrium unemployment as the outcome of the matching process which affects the short-term dynamics by which the long-run equilibrium is achieved. This flow approach mainly focuses on the transition between labour market states (i.e. employment vs. non-employment). In so doing, it is possible to analyse the consequences of various shocks on firm decisions to hire/fire workers, for example in the presence or absence of firings costs. Firing costs, by lowering both hiring and dismissals, may lead to a less aggressive dynamic in employment, especially in the short term, and concurrently increase the average period of employment, as well as the average duration of unemployment. However, even in these models, it is crucial to consider the configuration of labour market institutions as a whole (Bertola and Rogerson (1997)).

There is also the risk that marginal workers and categories (i.e. women, young workers) will be affected by reforms differently from other workers. As a consequence, the standard deregulation view should be analyzed as against wage disparities and employment opportunities for marginal workers, as well

as its implication for inactivity and joblessness. For example, Schmitt and Wadsworth (2002) argue that deregulation does not necessary yield better employment opportunities for these marginal categories, and is indeed associated with greater wage disparities and higher inactivity for marginal workers. A series of papers have also focused on the impact of deregulation on participation and employment opportunities for marginal workers, providing some evidence of a substitution effect between unemployment and inactivity. For example, Faggio and Nickell (2005) and Bicakova (2005) investigate the institutional and macroeconomic determinants of inactivity for low-skilled prime age men. Faggio and Nickell (2005) main conclusion is that there exists a trade-off between wage opportunities and social transfers: labour supply of less skilled workers is hit by the decreasing relative wage which may discourage and eventually lead to quit the labour force, low-skilled workers. Bicakova (2005), who proposes a comparative analysis of joblessness determinants for prime age men in the United States, the United Kingdom and France, points out that for this category of workers, inactivity is larger than unemployment in the first two countries, whereas the opposite holds true for France.

Cross-country regression of unemployment rates on institutions are not able to capture important dynamics in labour markets. As these works on labour dynamics underline, different institutions may have different impact not only on the unemployment level, but also on the short/long-term equilibrium that could be achieved. In fact, marginal workers and weak categories may be affected differently by the various institutional arrangements.

1.3 The data

In recent years, several databases to study labour market institutions have been developed: *i* the World Bank Regula-

tion database, to evaluate the regulation costs; *ii* the OECD database, to build quantitative indicators characterising the reform progress; *iii* the Fondazione Rodolfo De Benetti Social Reforms Database, to categorize reforms according to their expected effects on labour market flexibility; *iv* Chor and Freeman database, to measure labour practice; the ECFIN LABREF Database, to track reform measures over time.[14]

In addition to the theoretical models and econometrics specifications, the choice of dataset represents another crucial aspect that a researcher has to master in order to realize robust analysis. For example, the possibility of knowing how information was collected contribute to properly select the variables of interest, as well as the right model, thus concurrently allow the researcher to control the robustness of different model specifications. Otherwise, the risks are use inadequate techniques or not fully exploit information in the dataset.

In particular, when studying labour market institutions, the main difficulty a researcher faces is define the criteria to create indexes according to which a country is deregulated or regulated. Indeed, cataloguing different features of country institutional settings (i.e union density and coverage rate) homogeneously, in relation to the limited number of cross-country observations, is a difficult task. In general terms, it is common practice to rely on group of country observations, distinguishing between liberal economy or neo-corporativism, but this will not allow to account for all possible combinations of institutional arrangements, such as union density, employment protection law, collective bargaining coverage, etc. Furthermore, country legislations are complex and relevant aspects of job-security provisions - such as the willingness of labour courts to process appeals by fired workers or the interpretation pro-

[14] A useful service is offered by IZA Data Service Center, which facilitates the search for datasets which are relevant for labour economists, and is available at `metadata.iza.org`.

vided by judges on the rather vague notion of 'fair cause' for termination of employment contracts - are difficult to quantify. (Autor (2003); Bertola (2005, 2008); Ichino and Riphahn (2005)). Therefore, as long as countries have different combination of institutions, great risks are involved when creating cross-country sorting through aggregate indexes(Nardo et al. (2005)).

Besides rank-based indicators, legal and survey-based measures have also been constructed (i.e,Bertola et al. (2000); Di Tella and MacCulloch (2005)). However, even these indicators must be treated cautiously since survey-based indicators may depend on economic conditions, whereas legal indicators may reflect the political-economic influences on the judicial process (Ichino et al. (2003)).

Some caution must also be paid when looking at data which provide information on fixed-term contracts. These contracts imply important differences in term of costs and conditions compared with open-ended contracts. When studying the effect of firing costs and unemployment benefits, we should not neglect the differences. As Freeman (2005) suggested, the process of liberalization of fixed-term contracts, while maintaining firing costs, could lead to perverse effects. It is important to underline that most studies which used the indexes created by the OECD could reach wrong conclusions if they do not distinguish between firing costs and fixed-term contracts. Theory suggests that effects of these two components on productivity and employment might be different.

In the light of these macro-dataset shortcomings, but without relinquishing the analysis macroeconomic approach, it appears reasonable to study labour market institutions by also relying on microeconomic data. In particular, the researcher may analyze how firms, unions and workers, along with other groups, interact one another in sufficiently complex systems which repro-

duce the main features of macro systems (Freeman (2005)). In fact, there exist adequately complex organizations which could provide indications on the functioning of institutions at a more aggregate level. For example, to judge whether labour market rules produce worse employment outcomes, the researcher could compare and contrast employment in firms with more or less rigid internal rules. While problems are incurred when generalising from micro-analysis to the whole economy, useful suggestions may still be inferred from the evidence of a little portion of a whole system.[15]

1.3.1 Time series cross section (TSCS)

Very often, when studying labour market institutions, researchers use techniques created to analyse panel data. However, in certain cases, it would be better to rely on tricks available for time-series-cross-section dataset (TSCS), which consists of a sequence of time series observed for different units - as in a panel dataset - where the value of time observations, T, is rather high in relation to the number of units. There is no a clear cut line. In general terms, one digit panel dataset for T is considered. Nevertheless the notations are equal and the distinction between these two types of datasets appears relevant, since it allows to neglect some issues which are involved in panel data analysis while creating new concerns to which attention must be paid.

Generally, in cross-country analysis of labour market institutions, three problems arise:

[15]The idea is to follow the approach of insider econometrics. In this kind of studies, in order to better understand the different incentives in human resource management, analyses are performed by relying on dataset collected through rigorous work. More precisely, in order to analyse the effects of different incentive schemes, the analyst makes reference to a series of guiding principle: identifying a restricted portion of the productive system which could be modelled empirically; visiting the (most important) working sites; interviewing different individuals so as to get different viewpoints; accurate collection of panel data on production, technology and organizational practices.

- **simultaneous correlation of error terms among countries**: when there is correlation among errors in different observations, it is generally assumed to be constant over time and be present in a certain point (for example a negative oil shock which affects all economies at the same time);[16]
- **autocorrelation in the residuals**: by mostly relying on dynamic models, we can grasp autocorrelation. Nevertheless, in this case, attention must be paid to the remaining autocorrelation, otherwise estimation will be biased;[17]
- **specific heteroschedasticity for each country**: in this situation the most important decision is whether "pool or not to pool". The easy way to master heterogeneity is to introduce fixed effects, which means a dummy variable for each country. The other extreme case is to consider a specific coefficient, β_i, for each country (random coefficient model). Although both methods are correct, some doubts arise for intermediate solutions which are more difficult to accept, unless they rely on theoretical ground.[18]

In this connection, the issue whether fixed effects should be included in TSCS models or not arises in most comparative

[16] In that case it could be possible to use FGLS. But, in case of simultaneous correlation and heteroschedasticity , it seems more correct to use robust standard error for panel data (PCSEs) instead of standard OLS errors. The latter stems directly from the traditional formula for OLS standard error when Gauss-Markov hypotheses are infringed. For the former, the formula is a bit different from the procedure of White (1982), as the errors computed in this way can account for heteroschedasticity but not for autocorrelation.

[17] The usual approach with panel data is use an instrumental variable (IV) estimator (Anderson and Hsiao (1982), Arellano and Bond (1991)). Kiviet (1995) takes a different approach by estimating the bias and correcting the estimation accordingly. Sometimes this procedure may prove better than the IV estimators, but is somewhat hard to implement. However, Beck and Katz (2007) show that in the case of TSCS data, i.e. with values of T greater than 10, 20 or even 30, Kiviet correction or IV methods are not worth their costs.

[18] For example, as previously noted, when analysing European countries, it is reasonable to estimate a different coefficient for the new European Union Member States (Beck and Katz (2004))

empirical studies. It is possible to test for the inclusion of such effects. However, Beck and Katz (2004, 2007) state that F test for the significance of fixed effects may be too liberal in rejecting the null of no effects since rejection is more likely in the presence of many units.

Another important concern is the fact that the inclusion of country fixed effects precludes the inclusion of time-invariant or slowly-changing variables as independent variables. Distinguishing between their influence and the influence of omitted country-specific variables might be difficult. If fixed effects are not included in the model, the time-invariant variables will carry the weight of all country specific factors. To overcome this problem, Plümper and Troeger (2007) propose a procedure for analyzing the effect of time-invariant variables in a model including fixed effects. Their procedure has three stages: (i) estimate a fixed-effect model; (ii) regress the unit effects on the time-invariant variables; (iii) re-estimate the first stage including the error term of the second stage (XTFEVD procedure). Their Monte Carlo experiments suggest that the fixed effect vector decomposition (XTFEVD) estimator is the least biased estimator when time-variant and time-invariant variables are correlated with the unit effects.

Finally, the researcher must not use methods for stationary series with non stationary ones (spurious regression). In fact, even for panel data traditional techniques (trend, correlograms, unit root tests) are available, usually applied to time series. There is also a growing literature that tries to adapt these techniques to the case of TSCS data (Levin et al. (2002), Beck and Katz (2004)). A very careful work in coping with these problems is Amable et al. (2007). The authors present results of regressions based on three different estimators: PCSE, GLS and FEVD. In addition, they also build time series data to account for the annual evolution of employment protection legislation (EPL) and use new data for unemployment insurance

net replacement rates.

1.3.2 How to interpret results?

Even after selecting the appropriate econometric techniques for the available data, non trivial problems persist to discover the causal relationship among variables. It is important to underline that regression simply provide indications to the researcher for the capacity of a variable to explaining the path of another variable. This, however, does not mean that a variable causes the other. For example, Baker et al. (2005) noted how in the OECD analysis of 1997 it is reported "that there exists wide consensus in recognizing that unemployment rates are closely connected with the generosity of unemployment benefits", thus neglecting the possibility for governments - faced with a period of high unemployment - to increase benefits to manage the social crisis.[19]

In econometrics, this way of looking at things is called reverse causality or, in other words, endogeneity problems. It means that variables influence one another and there is a feedback process. For example, a positive relationship between replacement ratio and unemployment could in fact reflect both government propensity to increase benefits when unemployment is high and an effective influence of this institutional variable to determine high unemployment rate (because, for example, higher benefits lead to a growth of the reserve salary).

To address this issue, there is not just a single way. Rather than taking institutions for granted, a new strand of research attempts to understand institutions as a result of an endogenous

[19] Bredgaard and Larsen (2008) show how such a reform - by decreasing temporary workers' contractual power of temporary workers - may reduce the unemployment rate on the one hand, but, on the other, may lead to higher turnover since firms consider more profitable to fire workers, even though the productivity level is greater than wages. In so doing, they can avoid the additional wage costs arising from employing permanent workers. See also Cahuc and Michel (1996).

process (Acemoglu et al. (2005); Arpaia and Mourre (2005); Saint-Paul (2000)). On the one hand, it is possible to rely on instrumental variables (IV) and methods of estimation (i.e., GMM). For example, this is the choice of Bassanini and Ernst (2002) who rely on lagged variable. In general, other instruments may be available, such as political and ideological (Botero et al. (2004)) and religious tools (Algan and Cahuc (2006)). An alternative solution could be a Granger test for the series. However, caution must be used even with Granger tests, as these tests offer indications on the ability of some variables to predict the behaviour of another variable, but it does not imply that a variable cause another one in the economic sense.

As these discussions suggest, the researcher with mild/strong priors may reach incorrect conclusions, either by applying to his dataset inappropriate techniques, or by interpreting simple correlation in cross-country regression as casual relationships. To really understand how institutions work, the researcher must make greater efforts to discover the data generating process. As the next section highlights, an important step in this direction is represented by experiments and simulations with artificial agents.

1.4 Experiment and computational economics

Instead of relying only on empirical data, it could be useful to rely on analysis based on experiments(EXP) (Kagel and Roth (1995)) and simulation with artificial agents (ACE)(Neugart (2008), Tesfatsion and Pingle (2003)).

Experiments analyse individuals' behaviours - and hence the emergence of some regularities - by means of simulations, in general using computer, in order to study their choices in different situations (number of interactions, type of communications

and sequence choices). Conversely, simulations with artificial agents study the relationship between micro and macro-level by means of totally artificial experiments. There are no human beings involved in the analysis and thanks to computer program it is possible to replicate a vast series of human behaviours (from stupidity to complex ways of thinking).

The distinction between the two is pure didactics. There are many growing complementarities between these two worlds (Contini et al. (2006)). The most important aspect to stress here is that both EXP and ACE refuse the classic assumption of rational economic agent, emphasizing the role played by heterogeneity, bounded rationality and learning. In particular, as they allow to discover the data generating process, they enable the researcher to reproduce all possible histories or at least to understand under which conditions a realization (story) came out. In fact, a key advantage is the possibility of mastering crucial aspects of the economic environment, such as technology, market structure and trends in economic fundamentals. Moreover, in all experiments institutions are exogenously changed, thus making causal inferences possible. This is perhaps the most important advantage of laboratory experiments. For example, in the case of an institution such as the minimum wage, an experiment allows to observe wages before and after the minimum wage is introduced, while keeping everything else constant. In reality, governments choose institutions endogenously in response to current or anticipated economic conditions on the market (Falk and Huffman (2007)). As the previous section shows, econometric strategies - such as instrumenting for policy changes - may mitigate the problem, but cannot achieve the exogenous variation provided by laboratory experiments.

Finally, experiments and simulations also allow to observe the impact of institutions on the behaviours of individual economic agents. In field data, changes in micro-behaviour must be typ-

ically inferred from changes in aggregate outcome.

There are also some disadvantages inherent in these two methods. The most important is probably the limited generalizability which, however, is a criticism that can be levelled at any dataset. Another important concern which is often raised is that they may be too simple and missing important aspects, which could also be relevant (Falk and Huffman (2007)). However, just as any economic model, simplicity should not always be seen as a defect but also as an effort to grasp all the features which are essential to tackle a problem. These limitations do not invalidate the potential of EXP and ACE, but make them a complement rather than a substitute for field data.

For example, Neugart (2004) develops a model that allows to analyze the impact of labour market policies (macro-level) - training aids - starting from individual decisions. More precisely, he shows how the unemployment rate decreases thanks to the benefits that lead workers to invest more in capital accumulation. The major consequence is that workers are places in a situation in which they are able to perform new jobs. In other words, these policies can reduce frictions in the labour market.

In their laboratory experiment, Falk et al. (2006a) study the effect of the introduction of a minimum wage on salaries paid by firms and on workers' reservation wages. The main result of their study is an increase of real wage after the introduction of a minimum wage. This result is related to workers' reservation wages and what is considered fair wages: wages which were considered acceptable in the absence of a minimum wage are perceived - after the introduction of this institutional rule - low and unfair, and therefore no longer accepted. Falk et al. (2006a) also study the removal of a minimum wage. Contrary to standard economic wisdom, the effect is not symmetric and, even after the removal of the minimum wage, real wages stay

close to the previous level. This means that the minimum wage has permanent effects on real wages. These results, considered altogether, show that the minimum wage affects the reservation wages in a complex way. The possibility of identifying these effects rest on two important features which are not possible to achieve with field data: the direct observation of reservation wages and the comparison between a labour market with and without a minimum wage, while keeping all the other variables fixed.

Falk et al. (2008) investigate the economic consequences of employment protection legislation (EPL) in a competitive labour market with incomplete contracts. Their findings provide insights into the circumstances in which EPL performs well or poorly. In particular, the impact of EPL depends on the flexibility of the contractual forms available to companies and on the extent to which firms can observe performance and reward or punish using contingent compensation. With incomplete contracts, the firing threat is crucial for market efficiency and dismissal barriers worsen performance by hindering this incentive device and discouraging the relationship formation. On the contrary, with greater flexibility in contractual instruments - for example under the form of bonus pay - the negative effects of dismissal barriers on incentive and efficiency is offset almost completely. This work shows to what extent market outcomes are the result of a complex interplay between contracts and institutions and to what extent it is consistent with the empirical literature, which sometimes records zero or moderate effects of EPL on the various types of outcomes. In particular, it highlights how labour contract flexibility is relevant to consider whether dismissal barriers have a strong or weak effect on market performance.

Finally, a study of Falk et al. (2006b) uses laboratory experiments to investigate two issues related to workfare. Firstly, it demonstrates that - in line with economic theory - work re-

quirements shift the individual labour supply curve downward, thus establishing a positive workfare incentive effect. Secondly, it tests the political support to workfare. In an experiment where subjects could vote in favour or against workfare - before knowing whether they will be personally affected or not - tremendous support was recorded for workfare: roughly 84% of subjects voted for the imposition of a work requirement. The main motivation for supporting workfare was primarily social, in the sense that people indicated fairness, social rules or the desire to punish free riders.

In summary, these studies highlight how EXP and ACE are powerful tools for studying labour market institutions. In order to develop more realistic priors about how people and institutions operate in aggregate economies, we should make greater use of these two modes of analysis (Freeman (2005)). While the leap from laboratory experiments and simulations to actual institutions is great, they represent a useful complement to field evidence as they allow to make clear causal inferences; to observe variables which can be never observed in reality, as well as the impact of institutions in greater detail than on the field.

1.5 Conclusions

This paper mainly reviewed the empirical literature on labour market institutions, in order to evaluate the labour market rigidity account, also known as 'OECD-IMF' orthodoxy, according to which labour institutions and work arrangements are the cause of economic distress and poor performance. In spite of a growing number of economists who question the orthodox view, many studies conclude - although to different extents - that evidence supports the view that labour market institutions have mattered in determining the unemployment

pattern across OECD countries since the 1960s.

Different factors explain the adherence to this view. The first reason is that many hold strong priors that labour market operate better in the absence of institutions, which often have lead them to interpret simple correlation between labour institution variables and unemployment as causal relationship. This is evidenced by the fact that detailed analyses of the most influential cross-country statistical studies have recorded results which are very sensitive to the nature of the variables used, the time period and model specifications.

The second reason is mainly related to the cross-country data and econometric techniques used in the analysis. One of the main concerns related to the dataset on institutions and labour arrangements is that they are fairly poor compared to the data available for macroeconomic shocks and do not allow to capture all the country heterogeneity in the institutional settings. Therefore, a risk is involved in creating aggregated indexes by simply ranking the various countries. When studying labour market institutions by means of cross-country regressions, there is also the risk of using inadequate techniques. In certain cases, for example, a researcher would rather rely on tricks available for time-series-cross-section datasets, which are similar to panel dataset but with a rather high time observation value. A researcher must be aware that, while TSCS and panel data share a common notation, they differ and imply different challenges.

Therefore, in order to improve our understanding of labour market institutions and their effects on unemployment and economic performance, new investigations relying on micro-analyses of firms and workers, as well as human subject and artificial experiments, seem necessary. Even though there could be problems in generalizing from the micro-level to the whole economy, the analysis of adequately complex organizations may

really provide indications on the functioning of institutions at aggregate level. Furthermore, as in market experiments, the impact of institutions on individual agents' behaviours can be observed. Market experiments and simulations have also the important advantage to allow exogenous changes in institutions, thus allowing to discover causal relationships. This problem may be mitigated by econometric strategies, such as instrumenting for policy changes, but with experiments we can also control other crucial aspects of the economic environment, such as technology and market structure.

Probably the results stemming from these new lines of research will not settle the debate on labour market institutions, but they might be helpful to reach a more shared view.

As further cross-country regressions will not be decisive, this study suggests to perform analyses relying more on sophisticated data and TSCS techniques, as well as on expensive human subject and artificial experiments.

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Chapter 2

Work arrangements and firm innovativeness: is there any relationship?

Abstract

This study investigates the relationship between labour market flexibility - proxied by the proportion of temporary and part-time workers - and firms' innovative ability, as measured by the percentage of new products in total sales. On the one hand, 'more flexibility' (i.e. a higher labour turnover) might be favourable to a firm's innovation potential. Besides having (potential) wage savings, larger inflow of new personnel may enrich the pool of firm innovative ideas. On the other hand, higher work flexibility may also have some drawbacks: permanently high rate of people entering and leaving a firm may diminish

social cohesion and trust, and increase the probability of opportunistic behaviour. Results suggest that higher percentages of part-time workers are associated with a higher propensity to innovate, especially for firms in high-tech sectors, whereas results on other work arrangements are rather mixed.

2.1 Introduction

The majority of studies on labour market institutions examines the relationship existing between these institutions and unemployment. Although very important, concentrating on this aspect implies neglecting other equally relevant elements. There is still little focus in the existing micro-economic literature on the effect of work arrangements on firms' ability to innovate. On the contrary, we claim that labour market institutions may have a significant impact on firms' innovativeness.

Similarly, virtually all the economic literature on firm level determinants of innovation has dealt with issues such as corporate size, the degree of competition, the extent of protection granted by patents, thus neglecting organisational factors and human resource management practices which may provide a positive contribution to firm innovation performance. As a first attempt to fill this gap, we propose an empirical investigation aimed at examining the effect of work arrangements on firms' ability to invest and introduce new technologies. In particular, this study relies on a panel of Italian manufacturing firms to investigate the relationship between labour market flexibility - proxied by the proportion of temporary and part-time workers - and firms' innovative capacity, as measured by the percentage of new products in corporate total sales. As we want to adopt a firm perspective, the focus will be on flexibility at firm level (both internal and external), thus ignoring - insofar as possible - other labour market features (i.e. labour mobility across sectors and regions). The reasons for distinguishing between different kinds of flexibility rely on the assumptions - as argued in various theoretical papers - that their consequences for firm performance could be very different. On the one hand, one could argue that 'more flexibility' (i.e. a higher labour turnover) might be favourable for firms' innovation potential. Larger inflow of new people may enrich the pool of firms' in-

novative ideas and open up new networks. Moreover, it will be easier for a firm to replace less productive people with more productive ones.

On the other hand, higher labour flexibility may also have some disadvantages. A permanent high rate of people entering and leaving a firm may diminish social cohesion and trust and increase the probability of opportunistic behaviour. Long-term and trust-based relations may instead be required to develop tacit organizational competence and skills so as to improve productivity and performance by selecting and allocating competent people. In addition, such flexibility will diminish social capital, thus concurrently forcing firms to invest more money in monitoring and controlling (Naaspted and Storn (2005)), making the so-called 'hold up' problem even more relevant: as labour contracts are expected to be shorter, employer and employees may be reluctant to really invest in the labour relations (Kleinknecht et al. (2006)).

However, we expect consequences to be very different depending on firms' activities. In fact, the loss of social capital might be a much more serious concern for innovative and knowledge intensive firms. In that case, much of the knowledge created by firms' activities is embedded, to some extent, in the employees' human capital and, therefore, employees are not simply interchangeable with those outside the firm. In addition, the risk of revealing trade secrets and technological knowledge could discourage firm investments in R&D and innovation. For that reason, throughout our empirical analysis we will present results for firms in low-tech and high-tech industries. We will progressively use the dataset panel structure. Firstly, we adopt a cross-section Tobit model which accounts for the fact that firms are either innovative or not, and for those which are innovative the extent to which they are so (Mohnen et al. (2006)). This strategy allows us to keep selectivity problems under control. In recent years a number of panel estimators have been

suggested for sample selection models, where both the selection equation and equation of interest contain individual effects which are correlated with explanatory variables. Among these, we choose to rely on the estimator proposed by Rochina-Barrachina (1999) which extends Heckman's two-step estimator deriving an expression for the selectivity correction term for two different time periods.

The paper is structured as follows. In the next section we will briefly discuss different types of flexible labour, whereas in section 3 we will give a review of the literature on studies that either theoretically or empirically attempt to investigate the effect of work arrangement on firms' productivity and ability to innovate. Subsequently, after a description of the Italian labour market in section 4, and of the data we used in section 5, in section 6 we present the econometric model and results. The final section contains our comments and conclusions.

2.2 Labour flexibility: what does it mean? What does it imply?

In order to outline how different work arrangements might affect firms' performance, in this section we will describe different forms of flexible labour.

Labour market flexibility can be divided into three broad categories

- *market flexibility* which refers to the flexibility of the whole labour market (labour mobility, wage flexibility)
- *external flexibility* which refers to the numerical flexibility of labour to the firm's needs (hiring and dismissals, temporary contracts, private manpower agencies)

- *internal flexibility* which refers to the notion of firm internal flexibility (staff who was moved to a different department within the same firm)[1].

Market flexibility refers to the degree to which wages are adjusted to clear the market (wage flexibility), and to the degree to which people move between jobs, occupations, industries and geographical areas (labour mobility). We expect, for example, that there are intrinsic differences in work mobility according to different features of the skill job requirements among sectors, as well as a different degree of wage flexibility related to the strength of labour organizations.

Despite the institutional availability of different arrangements, firms are ultimately responsible for flexibility and the degree to which it is implemented. If firms do not choose to put into practice these working schemes, it makes very little sense to talk about flexibility. Our aim is to analyse external/internal flexibility and its consequences on innovation as used by firms.

External flexibility (or numerical flexibility) concerns the labour quantitative adaptation to firms' requirements by easily hiring or dismissing, as well as by means of temporary contracts. These are often called 'low road' practices, leading to higher staff turnover and to (possibly) low-trust labour relations (Kleinknecht et al. (2006)).

Internal flexibility is generally identified with functional flexibility, that implies the elimination of horizontal and/or vertical

[1]The most famous distinction of labour market flexibility is given by Atikinson (Atinkison (1984), Atinkison and Meager (1986)). He distinguishes flexibility depending on where flexibility takes place (inside or outside the firm) and how it is developed functionally, numerically or financially. It includes a notion of internal numerical flexibility, sometimes known as working-time flexibility or temporal flexibility. This flexibility is achieved by adjusting working hours or schedules of workers already employed within the firm. This includes part-time, flexible working hours/shifts (including night shifts and weekend shifts), working time accounts, leaves, over-time, etc. Another form of flexibility that is worth mentioning is locational flexibility or flexibility of place (Wallace (2003)). This entails employees working outside the usual workplace such as home based work, outworkers or teleworkers.

boundaries between job classifications and the development of multi-skilled employees. Since changes in skill requirements are achieved mainly through training, internal flexibility does not yield wage cost savings and, on the contrary, could even lead to a significant increase of these costs. In order to emphasize the labour qualitative adaptation to the companies' changing needs, these are often called 'high road' practices[2]. However, there is also a notion of internal numerical (quantitative) flexibility, sometimes known as working-time flexibility, achieved by adjusting working hours or schedules of workers already employed within the firm. This includes part-time, overtime, flexible working hours, working time accounts, seasonal changes, leaves. Even though the objectives are different from functional flexibility, flexible working time arrangements and leave schemes can be used to accommodate working hour preferences and enhance loyalty, enabling workers to match care and other responsibilities along with work responsibility, as well as training or educational breaks (Houseman (2001)).

As this paper focuses on firm flexibility, we will only analyse the effects of external and internal quantitative flexibility. Although it would be extremely valuable to master internal qualitative flexibility as well, the questionnaire does not provide such information.

[2]Labour market flexibility is generally perceived to exist in order to facilitate employers' needs. However, it can also be used as a method to enable workers to adjust working life and working hours to their own needs. These arrangements include leave schemes for maternity/paternity reasons, family or educational leaves, and are opposed to those which have been developed to accommodate employers' needs, such as unusual hours, over-time and temporary contracts. From this perspective, part-time work, flexible working schedule, and early retirement can be thought to reconcile both sides' needs. See (Chung (2006)).

2.3 Literature Review

As soon as works on unemployment and labour market institutions started (Lazear (1990)), the complexity of this relationship emerged. After decades of studies, works, conferences and policies, no clear conclusion has been reached yet, nor it has been possible to limit the domain of analysis. Recently, however, a growing interest has been shown with reference to the effects of work arrangements on firms' productivity and ability to innovate.

Cahuc and Postel Vinay (2002) showed that more regulated labour markets induce human capital accumulation by increasing the proportion of skilled workers, thus leading to increased productivity and growth. They suggest that any decrease in the minimum wage should be probably matched by appropriate educational, industrial or employment subsidies in order to compensate the possible welfare losses arising from lowering this measure.

Similarly, Acemoglu et al. (2001) showed that, in non-competitive labour markets, the existence of minimum wages can increase firms' investments in training, since it compresses the wage structure. The intuition behind this outcome is that minimum wage makes it more expensive for firms to employ unskilled workers because they will obtain a wage level higher than the competitive level. Hence, if firms provide training to workers whose productivity is below the minimum, they do not have to increase wages so that firms are the residual claimants of increased productivity.

According to Kleinknecht (1998), removing labour market rigidities may be beneficial in the short term, but it could become harmful in the long run since more flexibility on the labour market discourages product and process innovation, thus reducing productivity growth. In addition, softer employment protec-

tion and more flexible wage setting will give extra advantage to non-innovative firms versus innovative firms. In line with this assumption, Bassanini and Ernst (2002) found a negative relationship between labour market flexibility and R&D intensity in industries with more cumulative knowledge base. The work of Kilicaslan and Taymaz (2008) also showed that countries which introduce more regulations on employment conditions, labour administration and training achieve higher levels of industrial productivity. They also found that countries with low levels of inter-industry wage differentials are more successful in reallocating their resources and raising productivity.

Arulampalam and Booth (1998) deeply investigated the relationship between fixed-term contracts and training, part-time versus full-time work, and the complementarities between education and training. According to the human capital predictions, they found in five European countries a significantly lower probability for men with temporary contracts to receive training. On the contrary, they did not observe any significant differences on training between part-time and full-time workers.

Laursen and Foss (2003), using data on 1900 Danish firms, tested the hypothesis that human resource management influences positively the firm innovation performance[3]. They concluded that change in the organisation of the employment relationship (team-based organisation, decentralisation of decision rights, internal knowledge dissemination, quality circles...) does matter for a firm to be innovative. They claimed that workforce training and increased knowledge spreading, for example through job rotation, may be expected to be a force

[3]"[..] The term knowledge management is used to refer to the practices - implicit or explicit - used by a firm to acquire new knowledge and to rearrange and spread existing knowledge within the firm. It also includes strategies that are independent either to prevent the firm's own knowledge from 'leaking' out or to encourage the dissemination of its knowledge to partner firms and others from whom the firm might benefit in mutual knowledge exchange.[..]". (Hall and Mairesse (2006)).

pulling in the direction of a higher rate of improvement process and innovations. In particular, they stressed the importance of organisational requirements for coordinating the complementarities between different technologies for reaping the benefit they may produce.

Finally, in a framework similar to ours, Kleinknecht et al. (2006) show that external flexible labour led in Netherlands, during the 1980s and 1990s, to savings on firm wage bills, leading to the Dutch job miracle. However, they also showed that this coincided with a decline of labour productivity - firms that have a high turnover or high shares of temporary workers do not achieve significant increases in sales growth. In addition, their analysis illustrates that firms that relied on internal flexibility were able, in spite of higher wages, to increase their productivity significantly. This effect is particularly remarkable for firms that are engaged in R&D activities. In the authors' view these results confirm the hypothesis that functional flexibility is more beneficial to innovators because it makes them more willing to invest in trust and loyalty of their personnel, which - in turn - is crucial for the accumulation of (tacit) knowledge.

2.4 The Italian Labour Market

During the 1990s Italy gradually introduced new arrangements in the labour law system. In 1997, in particular, the law known as Pacchetto Treu (named after the then Labour Minister) expanded the range of admissible fixed-term contracts and started a phasing out of the monopoly of the Public Employment Service by opening the market to private job placement agencies. It also extended the spreading of part-time employment, fixed-term training and apprenticeship contracts for young workers[4]. In 2000, the Legislative Decree 61 - transpos-

[4]The search for increased flexibility has also been directed toward a range of labour and product market institutions, to the wage setting process, as well as administrative

ing the EU Directive on working time (93/104) - represented another important step towards more flexible work relations and the spreading of part-time contracts. It introduced elastic clauses ('clausole elastiche'), particularly significant for organising part-time work shifts on a flexible basis, as well as extra hours ('lavoro supplementare'), allowing employees to work longer than originally agreed[5].

As some authors suggested (Boeri and Garibaldi (2007), Daveri (2004)), such reforms were asymmetric and introduced a two-tier system - since the use of fixed-term contracts kept the legislation applied to the stock of workers largely untouched - and changed regulations only for a subset of workers. Subsequently, Italy, as well as other European countries which introduced two-tier systems[6], experienced - thanks to the significant contribution of fixed-term contracts - a protracted employment growth despite moderate output growth, which means a decline in labour productivity growth.[7] These results could be the negative effects of fixed-term contracts on labour productivity, as these flexible arrangements induced a change in the workforce composition, the entry of low-skilled workers and/or workers with low schooling levels.

We agree and we argue, as Kleinknecht et al. (2006) argued for the Netherlands, that this could be a reasonable explanation for Italy, too, since flexibility strongly affects the firms' innovative capacity and hence one of the key factors that enable firms to survive and grow.

rules (industrial action procedures, internal union organization and financing, administrative simplification)

[5]For a detailed description of this reforms see Emanuele et al. (2001). In 2003, further changes were introduced by the legislative decree 276 (the so-called Legge Biagi). It changed the elastic clauses, by introducing new flexible clauses, and the calculation criteria and inserted supplementary work (Rustichelli (2005)). However, this reform took place at the end of our sample, so we can neglect it in this analysis.

[6]Belgium, Spain, Netherlands, Germany, Sweden and Portugal. See Boeri and Garibaldi (2007).

[7]For an investigation of the effects of employment protection on firm productivity in the US see Autor et al. (2007).

2.5 Data description

The data used in this work are obtained by the two most recent waves - the 8th and the 9th - of the comprehensive survey on Italian manufacturing firms carried out by Capitalia (and previously by Mediocredito Centrale) every three years. These surveys are conducted through questionnaires, administered to a representative sample of manufacturing firms within the national borders. Questionnaires collected information over the previous three years (1998-2000 and 2001-2003) and, for the majority of firms, are supplemented with standard balance sheet data. [8]. The sample is stratified with references to the number of employees, goods/services sector and geographical area. Throughout the analysis we will rely on sampling weights to extend results to the overall population of Italian manufacturing firms and to avoid inaccurate estimates and standard errors. The 8th and the 9th survey include respectively 4,289 and 4,497 firms. To broaden the sample period of our analysis, we merged these two waves and obtained a reduced sample of 2,097 firms. This sample includes only those firms existing in both surveys and, hence, with potentially complete observations over the 1998-2003 period. We further excluded firms with incomplete information.

We will progressively use the data panel structure in order to check and address the endogeneity problems.

Based on this sample, tables (1) and (2) report the population percentages (and standard errors) of firms with either product or process innovation. The most important information is the

[8]The principal information contained in the questionnaire concerns: general news on the company, its ownership, controlling interests, and membership of groups, workforce, investment activities, technological innovation, research and development, internationalisation, commercial and competitive channels, finance. See *Survey of manufacturing enterprises* `http://www.unicredit-capitalia.eu/DOC/jsp/navigationDayOne/include_content.jsp?parCurrentId=0b0030398053d889&parCurrentPage=indagini_manifatturiere.html&parLocale=en`

increasing percentage of innovative firms, across size and sectors, over the period considered (the only exception is the % of firms with more than 500 employees making process innovation). These higher percentages reflect the higher number of firms carrying out R&D. As table (3) shows, particularly in high-tech industries, the majority of firms are involved in R&D activities. This is even more visible for larger firms where this percentage reached 92% in high-tech sectors[9].

2.6 The empirical model and results

External flexible workers earn lower wages whereas internal flexible workers, in general, do not. Do such cost savings affect the firms' innovative capacity? If so, in which way? In principle, lower wage bills are a competitive advantage. However, we also expect firms that employ more tenured workers and have a greater degree of internal flexibility to show higher productivity gains and better innovative capacity. On the contrary, firms that have a higher degree of external flexibility may incur in losses in terms of social and human capital. Therefore, we expect the consequences of greater external flexibility to depend strongly on firms' characteristics. The relevance of a possibly negative impact of flexibility on human and social capital may be worse for knowledge-intensive firms[10].

We adopt a generalized (Type 2) Tobit model consisting of two equations, where the first one is a probit equation determining whether a firm innovates or not ("propensity to innovate"),

[9]Firms where classified as in:

- low-tech sectors: textile, wood, food, plastic, paper, coke, non metallic and nec (not elsewhere classified).

- high-tech sectors: vehicles, machinery and chemicals

[10]We have no data on internal functional flexibility and therefore we can only investigate the consequences of quantitative internal flexibility and external flexibility.

and the second one is a linear regression (the Tobit equation or "intensity to innovate") explaining how much the firm innovates (Mohnen et al. (2006)). We will measure firms' innovative propensity by means of new processes and new products introduced into the market whereas firm innovation intensity can be measured by the share of innovative sales in total sales. Contrary to other types of surveys (i.e. Community Innovation Survey - CIS), it is not possible to distinguish between innovative sales corresponding to products new for the firm but possibly known to the market, which can be considered imitations of products already produced by other competitors, and those corresponding to products only new for the market, which can be regarded as true innovations.

Denoting by y_{1i} the binary variable indicating if firm i is an innovative firm - that is, a dummy variable indicating whether the firm has introduced at least one product or process innovation - we can write

$$y_{1i} = \begin{cases} = 1 & if \quad y_{1i}^* > 0 \\ = 0 & if \quad y_{1i}^* \leq 0 \end{cases} \tag{2.1}$$

where $y_{1i}^* = x_{1i}b_1 + u_{1i}$ is a latent variable that represents the incentives to innovate. x_{1i} is a vector of explanatory variables, b_1 is a vector of parameter to be estimated, and u_{1i} is a random error term, which includes the effect of left-out omitted variables. As explanatory variables x_{1i}, in addition to the amount of resources spent on R&D per employee (IE) and fixed capital per employee ($INVEST$), we use industry and area dummies, firm size and age ($LOGSIZE$ and AGE), and group membership ($GROUP$). Industry dummies capture technological opportunity conditions, industry-targeted innovation policies, and industry-specific labour market features as well as differential demand growth effects. Size reflects access to finance, scale economies and differences in the work organization (Mohnen et al. (2006)). In order to account for the fact that young

firms grow faster, we also add a dummy for firms that are less than three years old ($YOUNG$). It is valuable to include a dummy also for firms that underwent structural change during the period of the analysis ($M\&As$) and for firms operating on international markets ($INTERNATIONAL\ COMP$).

As the main objective of our investigation is to control how labour market regulations affects firms' innovativeness, we estimate the probability to be innovative controlling for different labour arrangements including in the explanatory set, x_{1i}, variables representing

- the internal flexibility: the percentage of temporary and permanent part-time workers (pt_temp and pt_perm), the percentage of workers who received training ($training$);
- the external flexibility: the percentage of full-time temporary workers (ft_temp), the percentage of workers with flexible contracts ($co.co.co$), the percentage of workers coming from manpower agencies (man_power), and the labour turnover ($turnover$).

The second equation of the Tobit (type 2) model is specified in terms of a second latent variable y^*_{2i} which is equal to the actual share of innovative sales y_{2i}, if the firm is innovative (i.e, $y^*_{1i} > 0$). Since the share of innovative sales is bounded by 0 and 1, it is preferable to perform a logit transformation of the data and express this second equation in terms of the latent logit-share variable $z^*_{2i} = ln(y^*_{2i}/(1 - y^*_{2i}))$ which varies from $-\infty$ to $+\infty$. Thus we can write our second equation as

$$z_{2i} = \begin{cases} = z^*_{2i} & if \quad y^*_{1i} > 0 \\ = undefined & if \quad y^*_{1i} \leq 0 \end{cases} \tag{2.2}$$

or equivalently

$$y_{2i} = \begin{cases} = e^{z^*_{2i}}/(1 + e^{z^*_{2i}}) & if \quad y^*_{1i} > 0 \\ = 0 & if \quad y^*_{1i} \leq 0 \end{cases} \tag{2.3}$$

where $z_{2i}^{*} = x_{2i}b_2 + u_{2i}$.

x_2 is a vector of explanatory variables, b_2 is a vector of parameters to be estimated and $u_{2i} > 0$ is an error term reflecting omitted variables. Since we have data on sale growth for the majority of the firms in the panel (98%), we decide to exploit the data panel structure in order to exclude the variable past sales growth ($g\_sales[t-1]$) from the explanatory variables we have in x_{2i}, and to include it in x_{1i}. This variable, in fact, can be a decisive factor of innovation, as reflecting stronger demand and easier internal and external access to finance. As many firms do not indicate the percentage of workers for different work arrangements, there are many missing values in the variables of our interest making our final sample of 1108 observations for the period 2001-2003.

Nevertheless, interesting results have emerged. In general, labour arrangements do matter when explaining firms' innovation capacity. In particular, the percentage of part-time workers and firm labour turnover appeared the most relevant in different specifications of the model.

Assuming that u_1 and u_2 are bivariate normal with zero mean, and $\sigma_{u1} = 1$, we can estimate the model as a generalized Tobit (type 2) model using STATA Heckman procedure for survey analysis. Preliminary results for the model without considering any labour variables are reported in table (4). Those preliminary results suggest the plausibility of the model, as it is indicated by the significance level of the selection variable g_sales_{t-1}, and problems of selection, as the ρ coefficient indicates. Results for the traditional regressors are in line with literature. Larger firms and firms facing international competition are more likely to introduce innovation. Firms with higher spending on R&D and fixed investment are also more likely to be innovative and have a higher percentage of sales stemming from innovative products. International agreements

also positively affects firms' ability to innovate.

In tables (5) results for the model controlling labour variables are reported, also in interactions with a dummy variables for high-tech. We observe that part-time workers positively affect the probability to innovate at 1% level. For high-tech firms, at 1% level, it also affects the percentage of new products in total sales. Though it could be more expensive to employ part-time workers, they might be involved in training activities so as to acquire and improve skills. For high-tech firms, at 1% level, a higher labour turnover has a negative impact on the probability to innovate, as well as on firms' intensity of innovation. This is probably because a higher turnover makes it difficult to develop long-term and trust-based relations. This, in turn, could mean firms' inability to take advantage of innovations or to promote innovation, not investing enough on those able to carry out R&D.

Results for low-tech firms are less clear. At 5% level, labour variables are all jointly significant. In particular, part-time variables turned to positively affect at 5% level firms' propensity to innovate, whereas variables accounting for external flexibility are not significant in the intensity to innovate equation.

2.6.1 Innovations and Work Arrangements

Relying on the same set of (time-varying) variables used in the previous section, and by completely exploiting the data panel structure, in this section we will estimate probability models for the introduction of a product or a process innovation so as to investigate the effects of different labour arrangements while controlling for endogeneity issues[11]. Given the fact that we

[11] As in this previous section, we calculated the mean of the labour variables - where available - over three/two years. Whereas we did not observe any response for three years in the 1998-2000 period, we assumed a value of zero. Since the assumption seems reasonable according to the questionnaire structure, this has been done in order to obtain a proper sample size.

only have two observations about the introduction of innovation, it is not possible to fully address the endogeneity problems and to identify causal links. However, since one fundamental problem is to control unobserved corporate characteristics that are constant over time, the conditional logit model will work properly. Conditional logit models eliminate the firm specific effects, but only switchers (that is, firms that introduced an innovation in just one of the two sub-periods) contribute to the likelihood function. Therefore, we can rely on a restricted number of observations. Indeed, we cannot master another potential source of endogeneity caused by technological shock that leads, for example, to an increase both in the probability of observing an innovation and in the research intensity (Parisi et al. (2006)).

Table (6) reports results for the conditional model, where in column (2) we re-estimate the model of column (1), but using a dummy variable for R&D, in IE's stead, the variable measuring the amount of resource spent in R&D per employee, as there were firms reported to R&D, but were not able to indicate how much they spent for this purpose. Likewise, $INVE$ is a dummy variable equal to 1 that replaces $INVEST$ for firm declared to have invested in fixed capital but did not indicate the amount. On the whole, results are substantially similar. For high-tech firms, variables representing external flexibility have a negative effect in explaining the probability of introducing process or product innovations. In particular, the percentage of workers coming from manpower agencies is negative and significant at 10%. The variable accounting for internal flexibility (the percentage of part-time workers) again are positive and significant for both group of firms, but for high-tech firms this effect is significantly higher.

These regressions confirm the importance of work arrangements in affecting firms' innovative capacity and reinforce previous results. In particular, the variables representing internal

flexibility have again positive effects on firms' ability to innovate for both high-tech and low-tech firms. Concerning external flexibility, especially for high-tech firms some variables turned out to be negative and significant, suggesting that they may have negative effects on firms' ability to innovate.

2.6.2 A panel data selection estimator

In recent years a number of panel estimators have been suggested for sample selection model, where both the selection equation and the equation of interest contain individual effects which are correlated with explanatory variables (Dustmann and Rochina-Barrachina (2007), Raymond et al. (2007)). Relying on this literature, in this paragraph we fully exploit the panel structure of our dataset by estimating a selection model where both the selection and regression equation may contain firm effects correlated to unobservables. In particular, we utilize the two step estimator proposed by Rochina-Barrachina (1999) which extend Heckman's sample selection technique developed in the first part of section 6 to the case where one correlated selection rule in two different time periods generated the sample.

The idea of this estimator is to eliminate the individual effects from the equation of interest by taking time differences, and then condition upon the outcome of the selection process being "one" (observed) in the two periods (Rochina-Barrachina (1999)). In the first step, two correction terms have to be estimated, the form of which depends upon the assumption made about the selection process and the joint distribution of unobservables. By noting that for a firm which is innovative in two periods, and therefore has been selected into the second stage estimation, first differencing eliminates firms' effect from equation (2.3), and with consistent estimates of the two correction terms, simple least squares can be used to obtain consistent

estimates in the second step.

More precisely, the estimated equation is now given by,

$$z_{i2} - z_{i1} = x_{i2} - x_{i1} + l_{12}\lambda_1(.) + l_{21}\lambda_2(.) + v_{i21}$$
$$\Delta z_{i21} = \Delta x_{i21} + l_{12}\lambda_1(.) + l_{21}\lambda_2(.) + v_{i21} \qquad (2.4)$$

where the subscript now indicates time 1 and 2, and λ_1 and λ_2 are the correction terms.

To construct estimates of the λ terms a bivariate probit of equation (2.1) is estimated in the first step for the two waves. Then, only for the subsample with $y_2 = y_1 = 1$, we carry out a regression of Δz on Δx, and $\hat{\lambda}$ to estimate the parameters of interest. Results for the bivariate probit (not reported) indicate a positive and significant coefficient of correlation between the two equations. Tables (7) and (8) report results for the second stage for low-tech and high-tech firms, respectively. As a test for the joint significance of lambdas do not reject the null hypothesis of joint significance, for both high-tech and low tech firms, second stage standard errors must be corrected. Though this estimator reduces the number of available observations in the second step, these regressions are useful to make comparisons with the cross-sections analysis conducted in section 5 [12]. The most striking result, for firms in high-tech sectors, is the highly significance level of the percentage of workers who received training. A positive variation in the number of workers who received training is associated with a positive variation in the share of sales stemming from innovative products. For both high-tech and low-tech firms, the variable accounting for labour turnover has at 10% level a negative effects. In addition, for low-tech firms the percentage of part-time workers

[12] In any case, even in small sample, this estimator is less biased than estimator ignoring correction for sample selection. Monte Carlo analysis also showed that is estimator is *1.* robust to violation of conditional exchangeability (that is, sample selection varying over time), *2.* free from misspecification affecting the individual effects in both equations, *3.*robust to correlation amongs variables over time, *4.* and robust to violation of the normality assumption (Rochina-Barrachina (1999)).

and full-time temporary workers now turned to be positive and significant with opposite sign. These results combined suggest the presence of threshold, beyond which a high level of workers entering and leaving the firm have a counter positive effects on firms'ability to innovate.

2.7 Conclusions

In modern economies firms' innovation and workers' knowledge are inextricably linked. Employees' skills and knowledge are a crucial asset of innovative firms: tacit organizational competence improves productivity and performance by selecting and allocating competent people whereas lack of skills and training can act as a constraint.

A firm which fails to develop skills risks to be unable to have a good implementation of new technologies and spread innovation in the whole firm, preventing workers from understanding and producing innovative products and processes. Training leads instead to an increase in the labour quality by equipping employees with greater skills and knowledge. This makes the practices - implicit or explicit - used by firms to acquire new knowledge, and the re-arrangement and dissemination of existing knowledge within the firm (human management practices), an important strategic resource as well.

The aim of this study was to test in which way flexible labour arrangements influence - by affecting the long-term relationship between firms and workers - firms' ability to innovate. Since there could be valuable differences, both in terms of costs and workers' attitude towards firms, we distinguish two different kinds of flexibility: internal and external. Internal flexibility does not necessarily yield wage cost saving and, on the contrary, could even lead to a significant increase. From this perspective, part-time work can be used to accommodate working hour

preferences and enhance loyalty, as well as for training or educational breaks. External flexibility aims instead at the labour quantitative adaptation to firms' requirements by easily hiring or dismissing, as well as by means of temporary contracts leading to higher staff turnover and to (possibly) low-trust labour relations.

In particular, we believe that the new labour arrangements, introduced in the nineties in the Italian system of labour law, might have influenced the Italian firms' ability to innovate simply inducing a change in the workforce composition.

Our econometric analysis seems to support this view. Results on internal flexibility indicate that higher percentages of part-time workers are associated with a better ability to innovate. This effect is stronger for firms in high-tech sectors. For high-tech firms, the percentage of workers who received training turned out to be particularly relevant. On the other hand, results on external flexibility are rather mixed. Especially for both high-tech and low-tech firms, a higher turnover negatively affects the percentage of new products in total sales. However, for low-tech firms, there are some labour arrangements that positively affect the degree of firms' innovativeness. A plausible explanation for these results is that an excessive use of flexible arrangement may be negative for firms' ability to innovate. In line with the European Directive 1999/70/EC, according to which 'permanent contracts must be the standard form across member States', the use of fixed-term contracts must be limited - due to technical, productive and organizational reasons - to extraordinary periods of firm activity.

Unfortunately, we do not have information on internal qualitative flexibility which would really capture the adaptation of labour to the changing needs of the firm. All these results combined, however, suggest that there is an optimum of flexibility, beyond which firms' labour flexibility can negatively affect the

ability of a firm to innovate and, hence, to survive and develop.

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APPENDIX I In this section the variables used in the regressions are described. They are obtained from the 8th and 9th survey on Italian manufacturing firms carried out by Capitalia every three years.

INNOVATION: dummy variable which takes the value 1 if the enterprise reports to have introduced new production processes or products during 2001

IE:Average total expenditure for internal and external R&D divided per employees over the period 2001-2003/1998-2000.

R&D: dummy variable which takes the value 1 if the firm reports to have carried out R&D during the period 2001-2003/1998-2000.

INVEST: Average gross investments in innovative tangible goods per employees over the period 2001-2003/1998-2000.

INVE: dummy variable which takes the value 1 if the firm reports to have invested in innovative tangible goods during the period 2001-2003/1998-2000.

YOUNG: dummy equal to 1 if the firms is less then three years old

M&As: dummy variable which takes the value 1 if the firm's was involved in merger and acquisition dealings.

INTERNATIONAL_COMP: dummy variable which takes the value 1 if the enterprise's most significant market is international (outside E.U.).

INTERNATIONAL_AGREEMENTS: dummy variable which takes the value 1 if the enterprise has developed technical agreements with firms operating on international markets (outside E.U.).

PATENTS_BOUGHT: dummy which takes the value 1 if the firms bought patents during the period 2001-2003/1998-2000.

PATENTS_SOLD: dummy which takes the value 1 if the firms sold patents during the period 2001-2003/1998-2000.

LOGSIZE: average number of employees during the period 2001-2003/1998-2000.

g_sales[t-1]: the turnover growth rate calculated using variables as collected during the period 1998-2000

pt_indeter: the percentage of permanent part-time workers

pt_temp: the percentage of temporary part-time workers

training: the percentage of workers who received training

ft_temp: the percentage of full-time temporary workers

co.co.co: the percentage of workers with flexible contracts

man_power: the percentage of workers coming from manpower agencies

turnover: labour turnover

Table 1: % of firms with a product innovation

FIRMS SIZE	**LOW-TECH**		**HIGH-TECH**	
(n° employees)	**1998-2000**	**2001-2003**	**1998-2000**	**2001-2003**
11-20	0.160 (0.014)	0.253 (0.027)	0.268 (0.017)	0.454 (0.034)
21-50	0.220 (0.015)	0.323 (0.032)	0.355 (0.016)	0.501 (0.027)
51-250	0.281 (0.030)	0.346 (0.039)	0.415 (0.015)	0.569 (0.022)
251-500	0.355 (0.064)	0.613 (0.076)	0.421 (0.046)	0.702 (0.050)
>500	0.598 (0.102)	0.671 (0.090)	0.391 (0.042)	0.426 (0.045)

() standard errors

Table 2: % of firms with a process innovation

FIRM SIZE	**LOW-TECH**		**HIGH-TECH**	
(n° employees)	**1998-2000**	**2001-2003**	**1998-2000**	**2001-2003**
11-20	0.287 (0.017)	0.321 (0.029)	0.287 (0.017)	0.297 (0.031)
21-50	0.364 (0.018)	0.397 (0.033)	0.371 (0.016)	0.417 (0.026)
51-250	0.490 (0.034)	0.497 (0.041)	0.494 (0.015)	0.508 (0.023)
251-500	0.460 (0.066)	0.660 (0.074)	0.498 (0.047)	0.614 (0.053)
>500	0.534 (0.102)	0.549 (0.099)	0.494 (0.043)	0.379 (0.044)

() standard errors

Table 3: % of firms doing R&D

FIRMS SIZE	**LOW-TECH**		**HIGH-TECH**	
(n° employees)	**1998-2000**	**2001-2003**	**1998-2000**	**2001-2003**
11-20	0.216 (0.016)	0.372 (0.030)	0.220 (0.016)	0.462 (0.034)
21-50	0.317 (0.017)	0.529 (0.034)	0.347 (0.016)	0.590 (0.026)
51-250	0.452 (0.034)	0.720 (0.037)	0.480(0.015)	0.704 (0.020)
251-500	0.632 (0.066)	0.879 (0.051)	0.561 (0.047)	0.783 (0.049)
>500	0.835 (0.079)	0.873 (0.069)	0.791 (0.044)	0.923 (0.031)

() standard errors

Table 4: Estimation results: HECKMAN BASE RESULTS
In the propensity equation the dependent variable is a dummy variable which takes value 1 if the firm has introduced at least one product or process innovation whereas in the intensity equation the dependent variable is a logit transformation of the actual share of innovative sales. The exclusionary variable is $g\_sales_{[t-1]}$

	Intensity Eq(2)		**Propensity** Eq(1)	
IE	0.2228***	(0.024)	0.1605***	(0.032)
INVEST	0.0232**	(0.010)	0.0235***	(0.006)
AGE	0.0022	(0.006)	0.0010	(0.003)
YOUNG	-0.8054	(1.508)	-0.0760	(0.436)
LOGSIZE	0.0004	(0.000)	0.0026***	(0.001)
M&As	0.7655**	(0.309)	0.1686	(0.141)
INTERN._COMP	0.1094	(0.201)	0.2000**	(0.101)
PATENTS_BOUGHT	-0.0729	(0.505)	0.0949	(0.288)
PATENTS_SOLD	-1.3512*	(0.756)	-0.6609*	(0.338)
INTERN._AGREEM.	0.3054	(0.316)	0.3946**	(0.173)
g_sales_{t-1}			0.3475**	(0.167)
Constant	-5.9344***	(1.100)	-0.6630**	(0.267)
ρ	0.8570***	(0.073)		
σ	1.6345***	(0.164)		
ll				
N	639		1417	

*p<0.10,**p<0.05,***p<0.01

Note: Regressions include sector and area dummies

Table 5: Estimation results: HECKMAN ADDING LABOUR VARIABLES
In the propensity equation the dependent variable is a dummy variable which takes value 1 if the firm has introduced at least one product or process innovation whereas in the intensity equation the dependent variable is a logit transformation of the actual share of innovative sales. The exclusionary variable is $g\_sales_{[t-1]}$

	Intensity		**Propensity**	
	Eq(1)		Eq(2)	
IE	0.2124***	(0.026)	0.1812***	(0.035)
INVEST	0.0040	(0.010)	0.0199***	(0.007)
AGE	0.0001	(0.007)	-0.0021	(0.003)
YOUNG	0.1125	(1.832)	-0.7406	(0.481)
M&As	0.5702*	(0.302)	0.0443	(0.147)
INTERN._COMP	0.1451	(0.213)	0.2394**	(0.118)
PATENTS_BOUGHT	0.0040	(0.509)	0.2328	(0.294)
PATENTS_SOLD	-1.2401	(0.909)	-0.5260	(0.440)
INTERN._AGREEM.	0.3474	(0.339)	0.4901**	(0.200)
pt_perm	0.8922	(1.349)	0.3384	(0.630)
pt_temp	0.5901	(1.876)	3.6953***	(1.245)
ft_temp	1.3572	(1.063)	0.3562	(0.450)
manpower	-0.6831	(1.181)	0.4125	(0.548)
cococo	-1.9631	(1.536)	-1.0022	(0.813)
training	1.8883	(1.248)	0.4350	(0.510)
turnover	0.0934	(0.095)	0.1137**	(0.057)
LOGSIZE	-0.0003	(0.000)	0.0023***	(0.001)
pt_permxHT	-3.7490	(4.266)	-1.5491	(1.932)
pt_tempxHT	25.0935***	(9.646)	3.2444	(4.734)
ft_tempxHT	1.4042	(1.447)	0.7312	(0.894)
manpowerxHT	1.4405	(1.719)	0.3940	(0.922)
cococoxHT	4.8549	(3.604)	2.0756	(1.641)
trainingxHT	-0.9841	(1.515)	0.1795	(0.819)
turnoverxHT	-2.3675*	(1.320)	-1.1653*	(0.631)
HIGH_TECH	2.0145**	(0.987)	0.2215	(0.385)
g_sales_{t-1}			0.3014	(0.090)
Constant	-4.5710***	(0.769)	-0.6148**	(0.245)
σ	1.5792***	(0.187)		
ρ	0.7975***	(0.078)		
ll	-30655.559			
N	559		1108	

*p<0.10,**p<0.05,***p<0.01
Note: Regressions include sector and area dummies

Table 6: Estimation results: CONDITIONAL LOGIT
In this model only switchers - that is, firms that introduced an innovation in just one of the two periods - contribute to the likelihood function. It controls for unobserved firm characteristics that are constant over time. The dependent variable is a dummy variable equal to 1 if the firm introduced an innovation in just one of the two periods.

	(1)		(2)	
IE	0.3365***	(0.103)		
INVEST	-0.0009	(0.001)		
RS			1.1925***	(0.259)
INVE			1.3196***	(0.391)
PATENTS_SOLD	-0.0665	(0.881)	0.7125	(0.964)
PATENTS_BOUGHT	1.3807	(0.977)	1.2529*	(0.753)
INTERN._AGREEMENTS	1.3597*	(0.744)	1.6121**	(0.760)
M&As	1.0219**	(0.424)	0.5774	(0.406)
LOGSIZE	0.0041	(0.005)	-0.0008	(0.004)
INTERN._COMP	-0.0164	(0.475)	-0.2480	(0.370)
AGE	0.5047***	(0.158)	0.6975***	(0.157)
training	-0.4623	(1.110)	0.4426	(1.163)
pt_temp	0.2059***	(0.060)	0.2111**	(0.087)
ft_temp	-0.3520	(1.010)	-0.9775	(0.879)
pt_perm	-2.6472	(2.698)	-1.5134	(1.649)
turnover	0.1668	(0.216)	0.7183	(0.742)
manpower	2.0882	(1.939)	3.9480*	(2.355)
cococo	2.6006*	(1.481)	2.4861	(1.533)
pt_tempxHT	74.5371*	(38.552)	53.2215	(40.013)
pt_permxHT	3.5723	(2.794)	1.7466	(1.797)
ft_tempxHT	2.8423	(4.621)	7.6202	(5.703)
turnoverxHT	1.4337	(1.574)	0.8210	(1.315)
cococoxHT	-0.0454	(1.939)	-0.0215	(1.866)
trainingxHT	0.4223	(1.718)	0.1540	(1.765)
manpowerxHT	-2.4205	(3.134)	-6.6649*	(3.796)
ll	-3662.53		-4577.97	
N	654		822	

*p<0.10,** p<0.05, ***p<0.01

Table 7: Heckman panel estimator for low-tech firms (Rochina 1999) Two-stage panel estimation. The first step (not reported), is a bivariate probit using all the observation to estimate λ_1 and λ_2. In the second step, for the subsample of firms that innovate in both period, that is with $d_1 = 1$ and $d_2 = 1$, I do least squares of Δy on Δx,λ_1 and λ_2.

Δ IE	-0.0347	(0.066)
Δ INVESTST	0.0241	(0.015)
Δ LOGSIZE	0.0057**	(0.003)
Δ PATENTS_BOUGHT	-1.4031	(2.905)
Δ PATENTS_SOLD	0.0000	.
Δ INTERNATIONAL_AGREEMENTS	-0.2212	(0.501)
Δ M&As	-0.7886*	(0.417)
Δ INTERNATIONAL_COMP	-0.4553	(0.334)
Δ AGE	-1.8770**	(0.759)
Δ pt_temp	-34.9962	(43.973)
Δ pt_perm	1.2238***	(0.297)
Δ ft_temp	2.0345**	(0.965)
Δ turnover	-0.1368*	(0.074)
Δ occasional	0.7207	(1.329)
Δ manpower	0.2598	(2.134)
Δ training	-0.2293	(1.003)
lambda1	1.1147	(1.157)
lambda2	0.8668	(1.085)
N	102	

*p<0.10,**p<0.05,***p<0.01

Table 8: Heckman panel estimator for high-tech firms (Rochina 1999) Two-stage panel estimation. The first step (not reported), is a bivariate probit using all the observation to estimate λ_1 and λ_2. In the second step, for the subsample of firms that innovate in both period, that is with $d_1 = 1$ and $d_2 = 1$, I do least squares of Δy on Δx,λ_1 and λ_2.

Δ IE	-0.0232	(0.027)
Δ INVESTST	-0.0530*	(0.027)
Δ LOGSIZE	-0.0061*	(0.003)
Δ PATENTS_BOUGHT	0.4391	(0.642)
Δ PATENTS_SOLD	-0.4083	(1.080)
Δ INTERNATIONAL_AGREEMENTS	-0.1678	(0.493)
Δ M&As	-0.4580	(0.366)
Δ INTERNATIONAL_COMP	-0.2992	(0.484)
Δ AGE	-1.4778**	(0.647)
Δ pt_temp	2.2529	(4.256)
Δ pt_perm	-1.1273	(3.030)
Δ ft_temp	1.2220	(1.027)
Δ turnover	-0.6787	(1.456)
Δ occasional	0.5982	(1.621)
Δ manpower	-0.7968	(1.747)
Δ training	1.3468**	(0.554)
lambda1	1.8720	(1.523)
lambda2	-0.7364	(1.170)
N	107	

*p<0.10,**p<0.05,***p<0.01

Chapter 3

Flexicurity pathways for Italy: learning from Denmark?

Abstract

The aim of this work is identify the advantages and risks of adopting flexicurity policies in Italy. In the first part, this paper analyzes flexicurity in Denmark, one of the leading country in this field. Even though it is not possible to directly transpose policies from Denmark to Italy, important insights were provided by such an analysis. In the second part, this work focuses on the Italian labour market only. In particular, on the basis of an experimental analysis, it investigates the possibility for Italy to adopt the first European flexicurity pathway which suggests to rely on contractual arrangements so as to gradually progress into better working conditions to address labour market segmentation. In this experiment the unemployment level is determined endogenously and the level of efforts made is observable by firms with a certain degree of uncertainty. Results

suggest that - especially in countries such as Italy, where there is a limited scope for increasing spending - these contractual arrangements can improve labour market efficiency by reducing the unemployment level and increasing workers' performance.

3.1 Introduction

The flexicurity model looks increasingly attractive to policy-makers in Europe. The European Employment Strategy (EES) calls for labour market institutions to adopt '*flexicurity*' principles. Specifically, guideline No. 21 of the Integrated Guideline for Growth and Employment for the period 2005-2008 calls on Member States to "*...promote flexibility combined with employment security and reduce labour market segmentation*". Likewise, the Annual Progress Report adopted by the Commission in the re-launched Lisbon strategy also calls Member States to " *...seek convergence of views on the balance between flexibility and employment security (i.e. flexicurity)*". The Joint Employment Report 2006/2007 reiterates the main priorities of the EES by emphasising once again the need for more stringent reforms in order to strike a better balance between flexibility and security in the labour market. In December 2007, following the Communication of the European Commission on 'Towards Common Principles of Flexicurity', the Council of the European Union endorsed the final and consensual version of the common principles of flexicurity. However, the EU is also aware that different countries face different challenges and that therefore there is not a single way, but rather several pathways, towards flexibility. The various ways to improve national labour markets are linked to historical choices, as well as to economic and social institutions. Although common principles can drive reforms, different modalities of flexicurity and combination with security can be followed. Thus flexicurity can (and should) take different forms from country to country.

After presenting a preliminary overview of the balance between flexibility and security, the aim of this work is analyse the Italian labour market and find out which are the advantages and risks of adopting flexicurity policies in this country. In order to do so, the first part of the paper briefly outlines flexicurity in Denmark, one of the leading country in this field, with particularly favourable labour market outcomes and a long-standing tradition of successfully implementation of flexicurity principles. Even though it is not possible to strictly compare their labour markets and directly transpose policies from Denmark to Italy, important insights can be gained in making such a comparison. In particular, the focus will be on institutional/policy differences between these two countries. The second part of this work focuses on the Italian labour market to investigate, by means of an experimental analysis, the adoption of the first European flexicurity pathway. This pathway suggests - for countries like Italy with a segmented labour market - to rely on contractual arrangements so as to progress into better working condition in order to improve labour market efficiency and address labour market segmentation. The experiment was conducted for two labour market environments: one in which firms were allowed to submit offers to workers without any restrictions, and one with protections, as firms might be obliged to submit offers to workers in accordance to workers' 'right to receive an offer', as determined by the number of periods they were hired by the same firms. In particular, in this experimental analysis, the unemployment level is determined endogenously by firms' employment policies and the workers' level of efforts is observable with a certain degree of uncertainty.

The rest of the paper is as follows. The next section introduces the flexicurity framework and section 3 briefly outlines its main strength in terms of labour market outcomes, as well as different modalities to implement the flexicurity policies identified

by the European Commission. Section 4 describes the main elements of the Danish model, by laying emphasis on the possibilities for policy transfer and learning for Italy. Once having analysed the Danish labour market model, section 5 proceeds to examine the Italian case and the current challenges that its labour market model is facing today. Always looking at these two countries, section 6 identifies the main difficulties and advantages in implementing such policies in Italy. Finally, section 7 presents the experimental analysis in order to test in which way flexible contractual arrangements affect labour market outcomes. Conclusions are drawn in the final section.

3.2 The flexicurity framework

While the term flexicurity was first coined to describe a particular piece of legislation of labour regulation in the Netherlands, the concept has nowadays increasingly been used to describe the Danish labour market where liberal employment protections are combined with high social security, as well as active labour market programs. From a previous situation marked by high and persistent unemployment, Denmark is now close to full employment. These favourable labour market outcomes - often referred as 'golden age' or Danish 'job miracle' - have been attributed to the unique Danish combination of flexibility and security.

The main idea of flexicurity is that flexibility and security - rather than being contradictory - can be mutually supportive. This approach transcends the simple trade-off between flexibility and security, where the former is seen to be in the employer's exclusive interest and the latter in the employee's interest. Flexicurity could be best seen as a system of joint and mutual risk management for workers and employers (European Expert Group (2007)). However, it must be recognized that

both flexibility and security are multidimensional concepts. In order to compare national labour market systems, an understanding of the analytical framework of flexicurity is required (Bredgaard and Larsen (2008)). In general terms, the possibility of combining different levels of flexibility and security is represented by means of the matrix (1)(Wilthagen and Tros (2004)).

As this matrix highlights, flexicurity is a complex and multidimensional concept which implies an analysis of different policy fields. Even though this matrix is a useful tool to identify relationships between flexibility and security, some important aspects might be neglected in it. For example, there can be contradictions between security arrangements provided by firms and those provided by the State, or there might exist different forms of regulation (law, contract-based..) at different levels (regionally, locally and individually). The most important thing, as pointed out by Leschke et al. (2006), is to look at this matrix by bearing in mind that flexibility and security are not necessarily in a trade-off relationship, but can go hand in hand in a mutually supportive or complementary relationship.

3.3 Why flexicurity?

While an increasing number of studies have been carried out to discuss the concept of flexibility, widespread consensus is lacking on how to measure flexicurity. Various indicators have been proposed but none of them can incorporate all the various aspect of flexicurity (i.e., see Philips (2007), Tangian (2005)). As the flexicurity matrix highlights, flexicurity is a complex concept that cannot be easily grasped by looking at one single dimension. In spite of not having flexicurity synthetic indicators, labour market outcome indicators have been identified to illustrate the positive effects of flexicurity. The most important

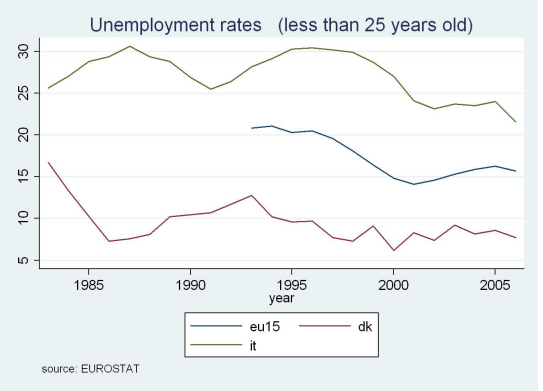
Table 1: Wilthagen's flexicurity matrix

	Job Security	**Employment Security**	**Income Security**	**Combination Security**
External Flexibility	Types of employment contracts EPL Early retirement	Employment services Training/LLL	Unemployment compensation Other social benefits Minimum wages	Protection against dismissals
Internal Flexibility	Shortened week Part-time arrangements	EPL Training/LLL	Part-time supplementary benefit Study grants Sickness benefit	Leave schemes Part-time pension
Functional Flexibility	Job enrichment Labour leasing Subcontracting Outsourcing	Training/LLL Job rotation Team work Multiskilling	Performance related systems	Working time arrangements
Wage Flexibility	Local adjustments Reductions in social security payments	Changes in social security system Employment subsidies In-work benefits	Collective wage agreements Benefits for shortened work week	Working time arrangements

Source: Wilthagen and Tros (2004) . This matrix illustrates the innovativeness of the flexicurity concept, which combines different forms of flexibility with different forms of security. More precisely, a distinction can be made between four forms of flexibility: *1.* numerical flexibility (adaptation of the number of employees); *2.* functional flexibility (between different work tasks); *3.* working time flexibility; and *4.* wage flexibility.
The innovative concept of flexicurity is to link these concepts with different form of security: *1.* job security, which enables workers to remain within the same firm; *2.* employment security, which enables workers to remain employed, but not necessarily with the same firm; *3.* income security, which maintains workers' income also in situations of unemployment and illness; *4.* combination security, which allows workers to reconcile working life and private life.

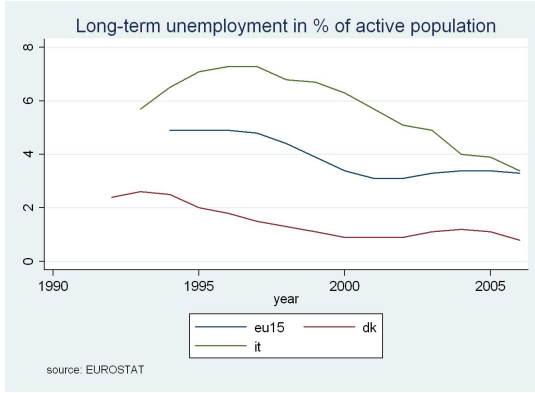
indicators of a successful balance are youth unemployment rate (15-24 of age), long-term unemployment, poverty risk, growth in labour productivity, total employment rate and women and older workers' employment rate. All these measures are available for downloading at the EUROSTAT website. Here, only some of them are reported. As figure (1), (3) highlights, the Danish road to fame has been supported by a number of impressive statistics.

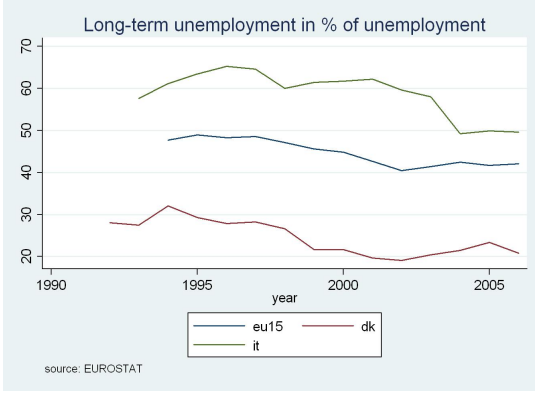
Figure 1: Low youth unemployment



The youth unemployment rate is low in a European perspective and shows a sharp downward trend. Even the long-term unemployment rate fell sharply in the 1993-2003 period. These figures however do not tell us that Denmark has almost a European record in the percentage of employed people who every year are affected by unemployment and receive unemployment benefits (roughly 20%). Nevertheless, Danish workers have a feeling of high job security among all workers' subgroups. A recent Eurobarometer reported that around 70% of Danes favourably view the fact of changing their jobs every few years (European Commission (2006)).

Figure 2: low long term unemployment





3.3.1 European flexicurity pathways

Although the convergence of national policies can be observed and common flexicurity principles have been identified (see Appendix 1), various modalities of flexicurity and combination with security can (and should) emerge from country to country. Each and every Member State faces different challenges and has different priorities. Therefore the Commission has defined four components on the basis of which flexicurity policies can be designed and implemented (European Expert Group

(2007), Bekker and Wilthagen (2008)):

- **Pathway 1: dealing with flexibility at the margin**. Within this pathway flexicurity aims at reducing the asymmetries between standard and non-standard contracts by promoting upward transitions on the labour market and by integrating non-standard contracts *fully* into labour law, collective agreements, social security and lifelong learning systems. It is also possible to make standard contracts more attractive by adding progressively adequate protections as the working relationship continues.
- **Pathway 2: securing transition from job to job**. This pathway emphasizes the need to allow for quick access to training funds and facilities, even at branch level, in order to ensure progress into new jobs either within the company or outside it.
- **Pathway 3: access to learning**. This pathway enhances the need to invest in skills and RD in order to address both employers' and employees' flexibility needs. In particular, labour market access must be kept for low-skilled workers and other groups at risk, such as women, early school leavers, older workers and minorities, so as to prevent them from becoming long-term unemployed.
- **Pathway 4: supporting transition to regular work**. Active labour market policies should prevent long-term welfare dependence and should offer incentives (or threat effect) and opportunities (or qualification effect) to return to work quickly (Madsen (2008)). This pathway also stresses the need to increase the employment of people in the informal sector.

Bekker and Wilthagen (2008) adds a fifth component as a general precondition: the development of a supportive and productive social dialogue.

Table 2: The Global Competitiveness Report 2007-2008

Rank	Country	Score
1	US	5.67
2	Switzerland	5.62
3	Denmark	5.55
4	Sweden	5.54
5	Germany	5.51
6	Finland	5.49
7	Singapore	5.45
8	Japan	5.43
9	UK	5.41
10	Netherlands	5.40

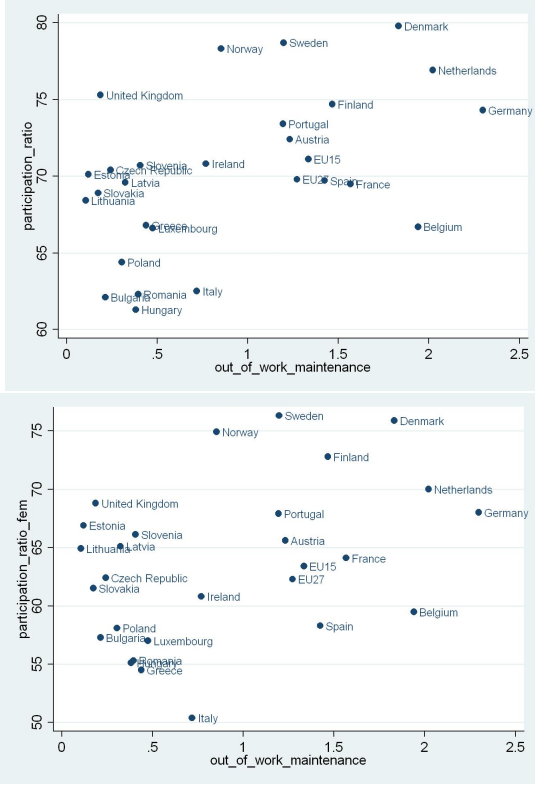
These pathways represent ideas that have been developed at EU level[1]. As the literature on policy transfer and Europeanisation illustrates, the barriers to policy learning - either directly from the neighbours or from policies advocated by the EU - are manifold: country vulnerability (i.e., the presence or the absence of economics crisis), political institutional capacity, policy legacies and preferences, etc (Schmidt (2002)). Therefore, each Member State must come up with tailor-made policies which are best suited to its specific history, institutions, starting position, political and cultural contexts. Simple transfers - and the Danish experience is not an exception to this rule - are rarely feasible. Nevertheless, as Madsen (2008) said, and every teacher would agree, one real-life example tells more than a torrent of abstractions! Therefore the positive international attention on Denmark over recent years is justified. A better understanding of Denmark's best practices can act as an important source of inspiration for change.

In fact, Denmark - along with Nordic countries - is a sort of counterevidence to the common assumptions that high taxa-

[1]For a detailed discussion on European pathways, see European Expert Group (2007).

tion is detrimental for competitiveness (in 2007 Denmark was once again ranked at the top of the World Economic Competitiveness Index, see table (2)) or that in European countries there is stronger preference for leisure (Blanchard (2007), Alesina et al. (2005)). Figure (3) shows that the European countries with high out-of-work maintenance and support are also the countries where the participation rate (especially females') is high. Obviously, this is not surprising considering that it is a prerequisite for the model to be financially viable to have high participation (and employment) rates.

Figure 3: Participation rate (total and female)



Let us examine the Danish experience in greater detail.

3.4 The 'Golden triangle': the Danish case of flexicurity

The Danish labour market model - often described as the 'golden triangle' - consists of three elements: the flexible dismissal rules, the generous and long lasting unemployment benefits and the active labour market policy (ALPM) (Bredgaard et al. (2005)). Using Wilthagen's matrix categorisation, the Danish flexicurity model combines high external numerical flexibility with a high level of income security and high level of employment security.

Denmark has very flexible hiring and firing rules. According to the OECD Report on employment protection, Denmark is one of the 25% of countries with fewest dismissal rules (OECD 2004). On average, about one quarter of all workers experience unemployment and job transitions at least once every year (Bredgaard et al. (2005)). Recognition of the employers' right to hire and fire at will dates back to the September Compromise of 1899, when employers' association and trade union movement entered into an agreement for settling disputes. Since the end of the 1980s, the only change to the Danish employment protection rules has been related to temporary agency work regulations, which allow more employment categories to rely on fixed-term contracts. No significant changes to employment protection were introduced in the 1990s.

While employment protection rules have remained almost the same for a number of years, some reforms of the social security system (such as unemployment benefits and social assistance for the unemployed) took place in the 1990s.

The underlying principle of these changes was not reduce the level of unemployment benefits but rather enforce the incen-

tives to seek and accept jobs. The eligibility period for unemployment benefits has been reduced drastically. In 1993 unemployed people were eligible for unemployment benefits for 7 years, and there was a right to requalification by participating in programmes during the activation period. Today, as a result of these reforms, the eligibility period for unemployment benefits has been reduced to 4 years and the right to requalification for eligibility in activation programmes has been abolished. The 'right and duty' principle has de facto been introduced. This means that unemployed people are entitled to receive compensation for loss of income but they must seek a job and take part in skills upgrading activities. The unemployed have the *right* to income support as well as the *duty* to activation after 12 months of unemployment. At the same time, society has the *right* to require something from recipients of income transfers, but also the *duty* to help them improving their job prospects (Andersen and Svarer (2007)).

As in Finland and Sweden, the unemployment insurance model is based on the Gent system - a voluntary scheme which is not managed by the State, but by trade union-linked funds.

The Danish Gent system of voluntary unemployment insurance is currently run by the 36 separate independent insurance funds (*a-kasser*) de facto affiliated to trade unions (LO, FTF, AC). All these funds are regulated by legislation, which defines common criteria for benefit eligibility and entitlement, as well as job search requirements, suitability of job offers and job seekers' readiness for employment. Except for two funds reserved for self-employed people, the structure of unemployment insurance reflects the Danish trade union structure, which differentiates between blue and white collar employees, as well as the educational and vocational skills achieved. In 2002, after a legislative change, further three funds began to use the newly-created option of recruiting members irrespective of their particular employment or educational background. Despite being actively

engaged in advertising their services and reducing membership fees, these competition-oriented funds cover only 17% of the total membership in Denmark (Clasen and Viebrock (2008)).Unemployment insurance is funded by means of tax subsidies and individual membership fees, which are less significant than the tax subsidies stemming both from general taxation and a hypothetical 8% labour market tax on gross earnings levied on all active people.

On the other hand, the active labour market policy (ALMP) is rather new and originated in the 1993-94 labour market reform. ALPM laid emphasis on upgrading skills and job training in order to increase the chances of the unemployed person to return to employment. It could be argued (referring to the flexicurity matrix) that there was a shift away from lifelong income security to a higher degree of employment security. Besides the employment security provided by an active labour market policy, an important role is played by education policy, particularly continuing vocational training (CVT) policies. Since 1960, the CVT policies have provided services and training for both the employed and the unemployed. Even if the social partners plan and run the CVT system, the State is its main purveyor of funds.

3.5 The Italian labour market

Time-series data on the EPL indicator (OECD 2004) shows a declining trend in the stringency of dismissal regulations. In Italy, as in most other cases such as Belgium, Greece, Germany, Sweden, Portugal and Netherlands, the change has been mainly driven by easing regulations on temporary employment, facilitating the recourse to fixed-term contracts and workers hired from temporary workers' agencies. In 1997, in particular, the law known as Pacchetto Treu (named after the Labour Min-

ister) extended the range of admissible fixed-term contracts and started to gradually abolish the Public Employment Service monopoly by opening the market to private job-placement agencies. It also further spread part-time employment, and fixed-term training and apprenticeship contracts for young new workers. The search for increased flexibility has also been directed towards a wide range of labour and product market institutions, the wage setting process, as well as administrative rules (industrial action procedures, internal union organization and financing, administrative streamlining and simplification).

Considering the political deadlock of loosening EPL for regular jobs, the expansion of temporary employment was a way to circumvent the stringent rules on regular contracts, but it was asymmetric and introduced a two-tier system, since the use of fixed-term contracts left the legislation applied to the stock of workers largely untouched. In 2000, Legislative Decree no. 61 - incorporating the EU working time Directive (93/104) - was another important step towards more flexible work relationship and the spreading of part-time contracts. It introduced the so-called elastic clauses ('clausole elastiche'), particularly significant for organising part-time work shifts on a flexible basis, as well as extra hours ('lavoro supplementare'), allowing employees to work longer than originally agreed upon.

In 2003, further changes were introduced by Legislative Decree no. 276 (the so-called Legge Biagi) which has changed elastic clauses, by introducing new flexible clauses, and the criteria to calculate and include supplementary work (Rustichelli (2005)).

As is well documented in Boeri and Garibaldi (2007), loosening EPL for fixed-term contracts - while maintaining stringent EPL for regular jobs - created two diverging effects. On the one hand, firms became more willing to hire new workers with fixed-term contracts, thus increasing job creation. On the other hand, by maintaining high firing costs for regular jobs the share

of fixed-term contracts turned into regular jobs decreased, thus leading to more job destruction. The main consequence was the creation of a dual market and lower productivity and output.

As to unemployment benefits, Italy represents an anomaly on the European scene, not only in terms of money spent in active and passive labour market policies. In general terms, current measures are not reactive to the economic downturn, either because they start on a regular basis or are available to long-term unemployed (Pirrone and Sestito (2006)). Moreover, these measures are granted without any connection with activation measures or, in other words, there are *rights* without *any duties*. This situation is even more acute if we consider that these measures are not available to every workers who has a working history and, moreover, those who have rights might not be the weakest workers. Finally, there is another peculiarity that makes the Italian system everything but an insurance system: the regular practice to depart from rules by extending these interventions close to their expiry date (Pirrone and Sestito (2006)).

3.6 Italy vs Denmark

The unemployment insurance system and employment protections are two alternative ways of protecting individuals against labour market risk and the Italian and Danish labour markets, as well as cross-country evidence, point to some degree of replaceability. However, the international competitive pressure seems to tip the balance in favour of the unemployment insurance protection system because it facilitates re-allocation and mobility if appropriately supported by active labour market policies.

Is it possible for Italy to make such a shift? Which will be the risks and the costs involved in managing a system mainly

based on unemployment insurance?

Firstly, this shift may prove to be very hard to put into practice due to political and economic constraints. As suggested by Boeri et al. (2004, 2006), the combination of employment protection and unemployment insurance may depend on the population skill structure. Their analysis outlines a political feasibility theorem according to which the employment protection reforms need to trade labour market flexibility with State unemployment insurance which redistributes in favour of the low-skill workforce segments. Furthermore, there exist also culture problems (Guiso et al. (2006)). Algan and Cahuc (2006) argue that the continental and Mediterranean European countries are likely to be unable to implement the Danish model because the lack of their citizens' 'public-spiritedness' raises moral hazard issues, which hinder the implementation of efficient public unemployment insurance. Therefore a country may be likely to fail in its labour market reforms without a comprehensive policy affecting its citizens' civic behaviour.

There is also the issue of optimal sequencing in the introduction of the different components of the flexicurity policy mix. Which policy should come first? Is there a way to make the mix and the various phases credible to workers? In this regard, the degree of trust between social partners - workforce, companies and the State - is crucial. Countries with a high level of trust between labour and companies have recorded a lower increase in unemployment than others (Blanchard (2007)). Trust should exist at different levels (Eurofond (2007)).

Finally, the Danish model is expensive: a protection system based on unemployment benefits and active labour market policies implies high budgetary costs. Is it feasible for Italy to implement the Danish model considering its high unemployment and budgetary difficulties?

The demographic changes which reduce the number of working

age people, thus lowering labour supply, challenge the ability of financing a system marked by generous unemployment benefits and a broad range of ALMPs, as well as the whole welfare system in general. Secondly, as the Danish labour market suggests - in periods of high pressure and technological progress - a large part of population will be potentially at risk of exclusion from the labour market. What will be the cost of its adoption in Italy? Simple quantitative exercise illustrates the large financial implications of adopting a generous system of labour market policies. The implicit increase in ALMP that would result from the adoption of the Danish spending intensity is to high for the Italian budget.

Figure (4) and (5), respectively, show the average spending on active and passive labour market policies in Italy and Denmark per unemployed and as a percentage of GDP. From these figures a huge gap in spending clearly emerges, both in absolute terms and as a percentage of GDP.

But which are the scope for implementing such a policy in Italy? As is well-known, the budgetary situation is not very positive in Italy. Figure (6) reminds us of the main constraints to policy changes in Italy. Both the overall debt and deficit (as a percentage of GDP) imply that there is no possibility of credibly funding higher spending in labour market policies by means of debt emissions.

The other strategy could be by means of taxation. Denmark, as well as Italy, has already one of the largest taw wedges on labour income among European countries. What will be the consequences of higher taxation? An exercise has been performed by Zhou (2007). Taking into account the endogeneity of the tax wedge to unemployment and that of unemployment to the tax wedge, the author found that the results of adopting flexicurity policies will crucially depend on the initial level and budgetary situation of the country. The theoretical framework

developed has been applied to the French economy to outline the main results. In France, and in other countries facing high unemployment and budgetary constraints, the implementation of the flexicurity model could be too expensive and the reduction in unemployment might be limited over the first years. Though offering important insights, the analysis completely neglects the existence of a dual market and the model sensitivity to parameter specification.

3.6.1 Flexicurity pathway for Italy

As the previous discussion suggests, there is limited scope for Italy to increase spending in ALMP and PLMP. Moreover, as the Danish experience suggests, these policies do not become more effective simply by raising total spending. Their effectiveness depends on their quality and their labour market relevance. The Italian labour market is a dual labour market where insecure temporary jobs coexist with highly protected or not flexible regular jobs. The application of flexicurity and equity principles calls for a fairer redistribution - across all workers' categories - of the cost of securing a flexible labour market (Ichino (2008)). The most practicable solution for Italy seems to be pathway no. 1. This pathway is particularly interesting for countries where the key challenge is a segmented labour market, with outsiders and insiders (European Commission (2007)). The main aim of this pathway is distribute flexibility and security more evenly over the workforce. So far open-ended contracts (job protection) have been the way to protect workers in Italy - and yet training opportunities and social security mostly depend on having such contracts.

In particular, priority must be given to address segmentation by means of contractual arrangements, which entail limited costs compared to active labour market policies, and take less time to deliver. This pathway will improve the position of

workers with fixed-term contracts, temporary agency work contracts, etc., by limiting the consecutive use of non-standard contracts and promoting timely progress towards better contracts. In addition, open-ended contracts must be redesigned to include progressive build-up protection, starting from a basic level of job protection and guaranteeing automatic progress into better contractual conditions until full protection is achieved. In so doing, the risk of getting stuck in less protected contracts will be reduced and protection will build up progressively with job tenure and security (Pirrone (2008)). On the lifelong learning side, public authorities and employers should improve training facilities for temporary workers. Nowadays, these categories often do not receive training opportunities. Incentives for workers and companies must be designed, at regional as well as at branch level, to ensure that everybody can benefit from training and to enhance participation.

Active labour market policies must become more effective. Moreover, public employment services must be able to deal not only with long-term unemployment, but also with a greater number of people experiencing frequent periods of unemployment. In particular, public employment services need to be strengthened in order to provide opportunities for people to shift from short-term to long-term contracts. Finally, temporary workers must be put in a position to accumulate rights by improving portability of entitlements from job to job.

3.7 Experimental analysis

The aim of this section is to rely on experimental analysis to test the European flexicurity pathway no. 1 in order to understand how contractual arrangements progressing towards better working conditions may improve workers' and companies' situations. The experiment lasts 12 periods and in each period

there are two contractual phases in each of which a firm can hire a worker. Workers can only trade with one firm in each period. In total there are 7 firms and 10 workers on the market - therefore the experiment implements an excess demand for workers. During the contractual phase, firms make contract offers $[w, \tilde{e}]$ to workers, which specify a wage w and a desired effort $\tilde{e}$. Firms can make private or public offers. In the case of a private offer, the firm specifies the identification number (ID) of the worker with whom it wants to trade, and only this worker is informed about the offer. This feature of the market allows the parties to build up long-term work relationship Brown et al. (2004). In the case of a public offer, all workers and all other firms are informed about the offer and firms are allowed to exclude up to 4 workers from an offer.

There is no third-party enforcing contracts. Workers may choose any feasible effort e, irrespective of the contractually proposed level . Effort is also non-verifiable. In fact, there is a given chance that the economy may experience a negative shock in some periods, leading some firms to suffer a loss. As firms cannot observe the level of effort supplied by the workers and there is no third part enforcing contracts, they are not able to infer whether low profits are due to shocks or to workers' low efforts.

I conducted my experiment for two labour market environments (treatment A and B). The experiment was run in the laboratory of CENTER at Tilburg University, relying on z-tree software (Fischbacher (2007))[2]. In treatment A, there were no protections: firms were allowed to make offers without restrictions to any worker. This means that firms had no firing costs. The second environment (treatment B) only differs from the previous one in terms of contract types. Appendix B contains a sample of the instructions of the treatment with protections.

[2]I wish to thank Caterina Giannetti and Maria Bigoni for their help in conducting this experiment.

In particular, firms in this treatment were obliged to submit offer to workers in the event of their being entitled to get an offer. The worker's right to get an offer was equal to the number of working periods he worked for the same firm. The salary the firm had to pay in these compulsory offers must be at least as high as the salary paid in the last period. There was, however, a trial period, as the right to get an offer starts only after two consecutive periods with the same firm. Hence, by hiring a worker for only one period, firms were still able to freely submit offer to other workers. Moreover, companies were also able to fire workers. At the end of each period, firms were asked whether and which workers they wanted to fire. For fired workers protections would not add up anymore, but firms were obliged to submit an offer to them as long as their right to get an offer was positive.

The monetary payoff for firms and workers was as follows. An employed worker received the wage w specified in his contract and had to bear the cost of effort provided $c(e)$. Effort costs increased convexly in the level of effort actually made (see the Effort table in Appendix B). A worker that remained unemployed in a given period received a payoff of 0 points, and his monetary payoff can be written as

$$\pi(w,e) = \begin{cases} w - c(e) & if\ a\ contract\ is\ concluded \\ 0 & if\ no\ contracts \end{cases}$$

A firm monetary payoff depended on the number of workers employed and the effort exerted by the worker(s). The production function was characterized by a decreasing return to scale of labour that was the only production factor. In addition, with a 10% probability firms could suffer a 15-point loss. A firm's profit function can be written as

$$\pi(w,e) = \begin{cases} 10 \cdot e_1 - w_1 - s & if\ 1\ employee \\ 8 \cdot e_1 + 8 \cdot e_2 + -w_1 - w_2 - s & if\ 2\ employees \\ 0 & if\ no\ contracts \end{cases}$$

where e_1 and e_2 are the actual levels of effort, w_1 and w_2 are the wages, and s is a negative shock. In the following paragraph behavioural predictions and results are explained in detail.

3.7.1 Theoritical predictions

There are previous experimental studies on the important topic of dismissal barriers and their effects on contract enforcements and labour market efficiency (Brown et al. (2008); Falk et al. (2008)). However, few of them consider the possibility of an endogenous level of unemployment. For example, the work of Altmann et al. (2008) which find evidence supporting theories of efficiency wages, as well as for models of unemployment as a worker disciplining device. Similarly, this paper analyses the emergence of unemployment in a market where the level of effort is observable only with uncertainty and there are different levels of contractual protections. In each treatment, firms can employ no worker, one or two workers, and unemployment is not voluntary, since it is caused by the firms' employment policies. These policies might succeed in eliciting higher efforts from workers according to different degree of protections. In particular, in this settings, predictions are the following:

- the probability to be employed should be higher in the second treatment
- the (average) chosen effort should be higher in the second treatment

For models based on risk-neutral labour market behaviour is hard to explain why protections should have real effects in equilibria where wages are allowed to adjust. The standard economic model of employment protections, exemplified by the

1994 OECD *Jobs Study* (OECD (1994a,b)), simply assumes that protections are merely an adjustment cost with no redeeming feature (MacLeod and Nakavachara (2007)). However, in the presence of market imperfections, contractual arrangements that progress into better conditions, like other labour market policies, can improve the welfare of at least a subset of agents.

The simple model of this experiment characterizes situations where gradual protections draws their effectiveness from the imperfections that prevent enforcement of contracts, and imperfect information about effort and personal characteristics, as well as on the state of the economy, might plague labour market outcome. Moreover, even though the provision of protections cannot eradicate all "unfair" behaviour, it can provide the right incentive to the workers to exert the required level of effort. Specifically, in treatment B, if a worker has worked hard, but the firm receiving a negative shock decided to fire him, the worker can subsequently take actions to impose a cost upon the firm reducing his effort in obliged offers. This cost corresponds to the penalty that behavioural economists have shown that individual are willing to impose upon others whom they feel have treated them unfairly. In psychological terms this cost may correspond to a loss of a worker morale and a lower performance for a period of time. This possibility should make workers more willing to invest in the relationship, leading to higher average effort in market with employment security. On the other side of the same coin, the possibility for firm to fire workers give them flexibility and acts at the same time as a disciplining device, leading to lower level of unemployment.

These intuitions are in line with the analysis of (MacLeod (2005)) that illustrates that when contracts are incomplete, either because firms use subjective measures of performance, or because relationship investments are difficult to measure, efficiency may be enhanced with a long term contract that in-

creases the cost of terminating employment. Also in line with this analysis, the contractual protections in treatment B allow the worker to impose a cost upon the employer. Finally, the possibility to get increasing protections as the working relationship gets longer decrees the hold-up of the employees, making workers more willing to invest into a long-term relationship.

Drawing upon the literature on incomplete contracts, a number of studies relying on field data (i.e.,MacLeod and Nakavachara (2007); Wasmer (2006)), have recently shown how employment law may enhance the regulation of the employment relationship, especially when relationship specific investments are likely to be important, thus leading to better labour outcomes. Similarly, as the results from this experiments suggest, some form of employment security, when firms cannot evaluate performance objectively, can enhance aspects of the employment relationship by making employee dismissal expensive without loosing flexibility.

3.7.2 Results

How do contractual arrangements reflect differences in market efficiency? To answer this question this section concentrates on two measures of market efficiency: workers' performance as measured by the effort level of employed workers and unemployment level.

Figure (7) displays average effort levels in the two treatments. As predicted, effort is higher in the environment with contracts that progress towards better protections. This is especially true at the beginning of the relationship, when workers and firms build up their relationship, but also towards the end of the game the exerted level is higher compared to the base treatment A. The Mann-Whitney U-test confirms this finding at a 1% level.

However, this might be driven by individual characteristics. Table (7) reports results for a truncated regression of the effort variable on a dummy for treatment along with individual characteristics that were collected through a questionnaire at the end of each session[3]. This regression confirms that in treatment B, the level of effort exerted by workers is significantly higher than the base treatment.

The second measure of market efficiency concerns the unemployment level in the two different market environments. Figure (8) shows the total unemployment level in the two treatments. On the whole, the unemployment level differs dramatically in the two environments, as the Mann-Whitney U-test confirms at a 1% level. Figure (9) shows the level of 'endogenous unemployment' and the evolution of unemployment over time. Significantly, the unemployment rate shows a decreasing - and virtually always lower - pattern in the treatment with gradual contractual protections. Even though this pattern does not clearly emerge in the first period and unemployment rate do not differ significantly at the beginning, towards the end of the game the unemployment rate falls under treatment B with better protections. One possible explanation is related to the effort exerted by workers at the beginning of the game. As this level is generally higher than in the base treatment, both workers and firms continue to invest in their relationship (Anderhub et al. (2003)). On the one hand, workers - in order to gain a contract renewal and an increased degree of protections - ex-

[3]In addition to questions concerning the individual characteristics, such as age, gender, field of studies, country of origin, number of years at university, there were questions on past trustworthy behaviour as in Glaeser et al. (2000). More precisely, players were asked:

- How often do you lend money to your friends?
- How often do you lend your personal possession to your friends (e.g., CDs, clothes..)?
- How often do you intentionally leave your rooming groups hallway door unlocked (when nobody is home)?

Table 3: Estimation results truncated regression

EFFORT	
treatment_B	5.8781***
	(2.039)
female	5.2236***
	(1.220)
age	-0.6392**
	(0.190)
years_at_univ	3.0094
	(2.198)
period	-0.1383
	(0.095)
really_distrust	-0.2501
	(2.391)
sigma	4.2832***
	(0.806)
ll	-371.1532
N	390

* p<0.10, ** p<0.05, *** p<0.01

Variables definition: *treatment_B* is equal to 1 for observations in treatment B; *female* is a dummy variable for women; *age* is the age of the player; *years_at_uni* is the number of years the individual has been studying at the university; *period* is a trend variable; *really_distrust* is a dummy variable equal to 1 if the individual answered 'never/sometimes' to the question 'How often did you lend money to your friend' and 'never/sometimes' to the question 'How often did you lend things to your friend?'.

ert a high level of effort whereas, on the other hand, firms are willing to invest in their relationship because, in case of a low level of effort, they have the option to break this relationship. In other words, firing acts as a disciplining device (flexibility), while contractual protections act as an incentive to invest in this relationship (security).

Table 4: Estimation results

	PROBIT UNEMPLOYED
treatment_B	-0.1749***
	(0.030)
female	-0.4921***
	(0.061)
years_at_univ	-0.1688**
	(0.072)
age	0.0123***
	(0.003)
period	-0.0066*
	(0.004)
really_distrust	0.3610**
	(0.155)
ll	-192.3273
N	312

*p<0.10, ** p<0.05, *** p<0.01
See previous table for variable definitions.

This result is confirmed by a probit analysis, reported in table (4), where the dummy for treatment B negatively and significantly affects the probability of being unemployed also when controlling individual characteristics.

3.8 Conclusions

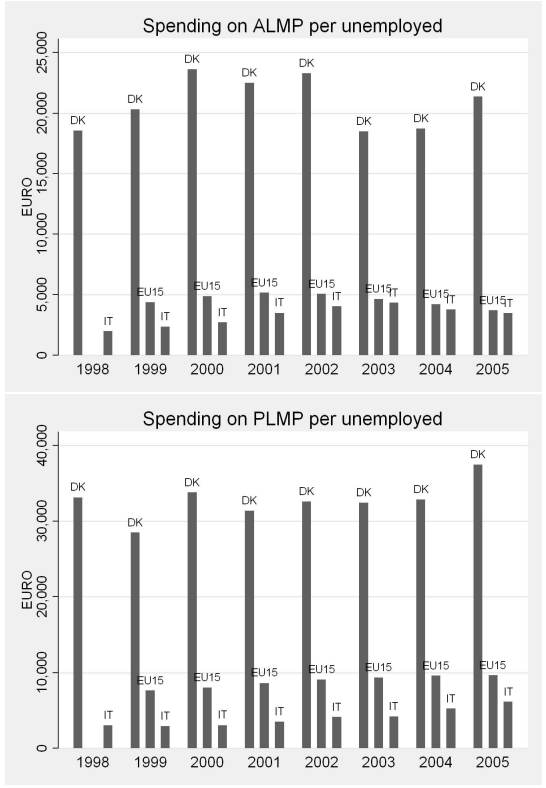
The aim of this work was investigate different paths of flexicurity in Europe. The experience of various European countries

has shown that flexibility and security are not necessarily diverging. However, although common principles might drive reforms, flexicurity should take up different forms from country to country. Therefore, the main objective of this paper was focus on Italy to analyse which of the pathways towards flexicurity identified by the European Commission is the best suited to this country. To gain insights on the advantages and disadvantages inherent in adopting such policies, the first part of the analysis looked at flexicurity in Denmark, one of the leading country in this field. Even though it is not possible to directly transpose policies from Denmark to Italy, important results were recorded. It emerged that in Italy - mainly due to budgetary constraints - a shift from employment protection system to an unemployment insurance system as in Denmark is not feasible. In addition, the application of flexicurity and equity principles to the dual structure of the Italian labour market calls for a fairer redistribution - across all workers' categories - of the cost of securing a flexible labour market. On the whole, this analysis suggested the first European pathway as the most practicable solution for Italy. According to this pathway, priority must be given to address segmentation by means of contractual arrangements, designing contracts which - starting from a basic level - include progressive protections.

Based on experimental analysis, the second part of this work investigated how contractual arrangements turn into market efficiency. The two experimental treatments performed only differed in the level of contractual protections. In the base treatment, there were no protections and firms were allowed to make offer without restrictions to any worker. In the main treatment workers were able to gain a right to receive an offer as the length of the working relationship increased. However, firms were also allowed to fire workers. Significantly, in this experiment the level of unemployment was determined endogenously and the level of effort was observable with a certain

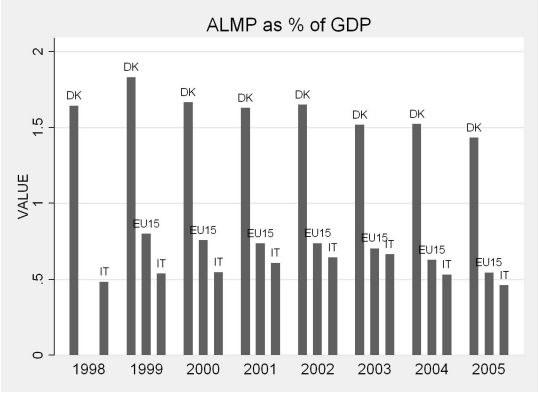
degree of uncertainty. Results suggest that - especially in countries such as Italy, where there is limited scope for increasing spending - these contractual arrangements can improve both workers' and firms' situations. As expected, the effort was higher and the level of unemployment significantly decreased in the environment with contracts which progress towards better protections. One possible explanation for this result is the right balance between flexibility and security: firing acts as a disciplining device (flexibility), thus making workers exert higher levels of effort, while the contractual protections act as an incentive to invest in the relationship (security), thus making worker more willing to invest in longer relationship and also firms more willing to hire more workers.

Figure 4: ALMP and PLMP in Italy and Denmark



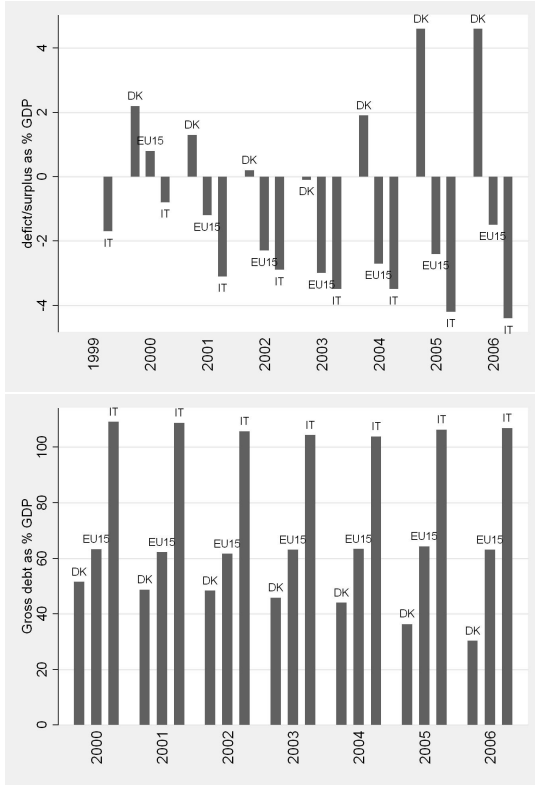
Source: EUROSTAT

Figure 5: ALMP as % of GDP



Source: EUROSTAT

Figure 6: Budgetary situation in Italy and Denmark



Source: EUROSTAT

Figure 7: Effort across treatment

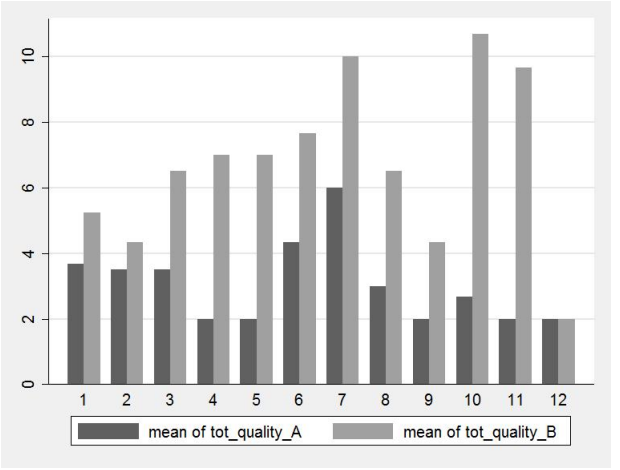


Figure 8: Total unemployment across treatment

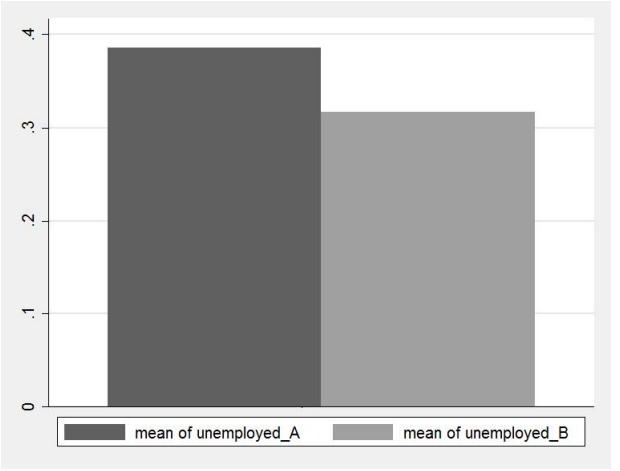
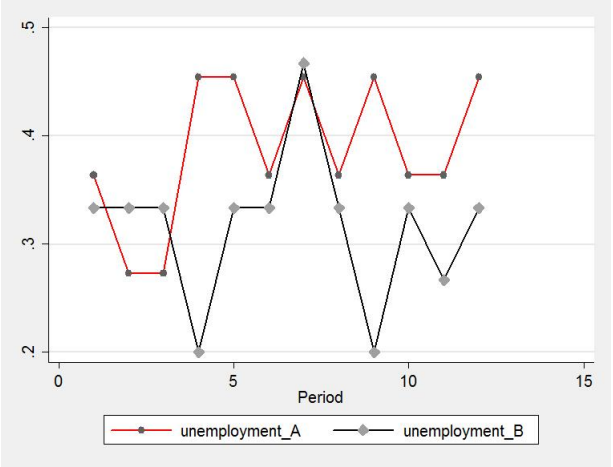


Figure 9: Unemployment across period and treatment



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.1 Appendix

Council of the European Union

The Common principle of flexicurity

- Flexicurity is a means to strengthen the implementation of the Lisbon Strategy, create more and better jobs, modernise labour markets, and promote good work through new forms of flexibility and security to increase adaptability, employment and social cohesion.
- Flexicurity involves the deliberate combination of flexible and reliable contractual arrangements, comprehensive lifelong learning strategies, effective active labour market policies, and modern, adequate and sustainable social protection systems.
- The flexicurity approaches are not about one single labour market or working life model, nor about a single policy strategy: they should be tailored to the specific situations of each Member State. Flexicurity implies a balance between rights and responsibilities of all the people concerned. On the basis of common principles, each Member State should develop its own flexicurity arrangements. Progress should be effectively monitored.
- Flexicurity should promote more open, responsive and inclusive labour markets by overcoming segmentation. It concerns both those in work and those out of work. The inactive, the unemployed, those who have an undeclared work, an unstable employment, or are at the margins of the labour market need to be granted better opportunities, economic incentives and supportive measures for easier access to work or stepping-stones to assist their progress towards stable and legally secure employment. Support should be available to all those in employment to

remain employable, to progress and manage transitions both in work and between jobs.

- Internal (within the enterprise) as well as external flexicurity are equally important and should be promoted. Sufficient contractual flexibility must be matched by secure transitions from job to job. Upward mobility needs to be facilitated, as well as between unemployment or inactivity and work. High-quality and productive workplaces, good organisation of work, and continuous upgrading of skills are also essential. Social protection should provide incentives and support for job transitions and for access to new employment.
- Flexicurity should support gender equality, by promoting equal access to quality employment for women and men and offering measures to reconcile work, family and private life.
- Flexicurity requires a climate of trust and broadly-based dialogue among all stakeholders, where everybody is ready to shoulder responsibility for change with a view to implementing socially balanced policies. While public authorities retain overall responsibility, the involvement of social partners in designing and implementing flexicurity policies through social dialogue and collective bargaining is of crucial importance.
- Flexicurity requires a cost-effective allocation of resources and should remain fully compatible with sound and financially sustainable public budgets. It should also aim at a fair distribution of costs and benefits, especially between businesses, public authorities and individuals, with particular attention to the SMEs' specific situation.

.2 Appendix

Instructions. Treatment B

You are now taking part in an economic experiment. Please read the following instructions carefully. Everything that you need to know to participate in this experiment is explained below. Should you have any difficulties in understanding these instructions please notify us by raising your hand. We will answer your questions at your place.

At the beginning of the experiment you will receive an initial sum of 6 euros corresponding to 200 points. During the course of the experiment you can earn a further amount of money by gaining other points. The amount of points that you can gain during the experiment depends on your decisions and other participants' decisions. All the points that you gain during the experiment will be exchanged into euros at the end of the experiment. The exchange rate will be:

1 point = 3 cents

At the end of the experiment you will receive the sum of money that you earned during the experiment in addition to your 6 euros initial sum.

The experiment is divided into periods. In each period you have to make decisions in different stages. Your decision will be entered into a computer. There are 12 periods in total.

Please note that communication between participants is strictly prohibited during the experiment. In addition we would like to point out that you may only use the computer functions which are required for the experiment. Communication between participants and unnecessary interference with computers will lead to exclusion from the experiment. Should you have any questions we shall be glad to assist you.

At the beginning of the experiment you will be divided into 2 groups: firms and workers. In this experiment there are workers and firms. You shall be a worker or a firm for the entire course of the experiment. As all the other participants, you will have an identification number (ID), randomly assigned by the computer, which you will keep for the entire experiment, except in the trial period. During the trial period, all participants will receive a provisional ID which will be changed as soon as the true game starts. Your ID will be displayed on top of the screen.

An overview of the experiment procedures

In each period of the experiment every worker can deal with one firm. The firm earns a profit if the effort exercised by the worker exceeds the wage and no adverse shock occurs. The worker earns a profit as long as he/she receives and accepts an offer, and the salary he/she gains covers the cost of the delivered effort.

The experiment lasts 12 periods. Every period is made up of 7 stages which include two contractual phases (in stage 1 and stage 3). Each worker and each firm can only enter one agreement in each contractual phase. Each firm can hire a maximum of 2 workers per period, whereas a worker can enter only into one contract per period. At least 3 workers will not reach any contracts in each period.

In every period, the procedures are as follows:

STAGE 1. The first contractual phase. Each period starts with a contractual phase, which lasts 150 seconds. During this phase firms can submit offers, which can be accepted by workers.

When submitting an offer a firm has to specify three things: - the salary offered; - which level of effort it requires from the

worker; - and finally, to which worker it wants to submit its the offer.

Hereby, firms can submit two types of offers; private offers and public offers. Private offers are submitted to one worker only and can only be accepted (and seen) by that worker. Public offers are submitted to all workers and can be accepted by any worker. Firms can submit as many offers as they like in each period, and are allowed to exclude up to 4 workers from a public offer. The offers submitted can be accepted constantly. In some cases, as explained further below, the worker has the right to receive a compulsory offer from a firm. In that case, the firm is obliged to make an offer that can be seen only by the worker to whom this offer must be addressed.

STAGE 2. Decision to hire a second worker. Following this first contractual phase, firms are asked whether they want to hire a second worker. Should they wish to hire a second worker (or a worker if they concluded no contract in the previous stage), they will enter a second contractual phase in STAGE 3, which is the same as the contractual phase in STAGE 1. In this stage, firms are also notified whether they should submit a compulsory offer. This phase lasts 15 seconds.

STAGE 3. The second contractual phase. Only firms that want to hire a second worker namely that answered yes in STAGE 2 - or have to submit a compulsory offer, and workers which did not conclude any contract in the first contractual phase will enter this second contractual phase. This stage is the same as STAGE 1 and lasts 150 seconds. During this phase firms can submit offers, which can be accepted by workers. Each offer has to specify the salary offered, the level of effort required, as well as the worker to which the offer is targeted. Once again, firms can submit private and public offers, and may be obliged to submit an offer.

Please note: If the same firm has hired the same worker

in two or more consecutive periods, the worker enjoys the "right to get an offer" according to the number of periods he/she worked for this firm. The right to get an offer is the number of periods the worker must receive an offer from the same firm with a salary at least as high as the one in the last period and is equal to

Right to get an offer= number of working periods with the same firm

When the right to get an offer is equal or greater than one, the firm has to make an offer in the following period(s). Depending on the latest contractual phase, the right to get an offer could be either in the next contractual phase 1 or 2. If the worker accepts the compulsory offer (or another offer from the same firm in the same period), the "right to get an offer" continues to exist. If he/she rejects and/or accepts another offer from a different firm, the firm is free to make an offer to any other worker. Once the firm has submitted the compulsory offer, the worker has 15 seconds to accept/reject the offer from the firm. Once this time has elapsed, the firm is also free to make offers to other workers. Be careful! If the firm does not submit the compulsory offer the computer will automatically after 50 seconds send the offer to the worker with the level of wage equal to the last wage and a level of desired effort equal to zero. Once again the worker again may either accept or reject but without any time limit.

STAGE 4. Choosing the level of effort. Following the contractual phases, each worker who has entered an agreement determines which level of effort he/she will supply to his/her firm. Therefore the worker is not obliged to supply the desired level of effort demanded by the firm.

STAGE 5. Your Income. Once every worker has chosen which level of effort to supply, incomes gained by each participant in

that period are calculated and shown on the screen. This stage lasts 10 seconds. The income of the firm depends on the level of effort supplied by the worker(s), but also on the state of the economy. There is a 10% given chance that a negative shock will hit the economy, thus leading some firms to suffer from a 15 points loss. The worker's income depends on the effort he/she chose and the wage received.

STAGE 6. A worker may be fired. Each worker, after two consecutive periods with the same firm, is entitled to receive an offer from that firm in the following period. At the end of each period, however, the firm that has hired some workers for two or more consecutive periods is asked whether and which worker it wants to fire. For workers who have not been fired, the right to get an offer will increase by 1 in each period with the same firm obliged to submit the offer. For fired worker(s) protections will not add up anymore. Firms, however, are obliged to make an offer for a number of periods equal to the worker's right to get an offer. Therefore, even if in the following periods the worker accepts an offer from that firm, these periods will not contribute anymore to the computation of the right to get an offer. The right to get an offer is kept (and can be exercised) as long as the worker accepts an offer from that firm. For each period the fired worker receives a compulsory offer, the right to get an offer decrease by 1.

Be careful! If in the last period the worker was hired in contractual phase 1, he has the right to receive an offer in contractual phase 1. If the worker was hired in the last period in contractual phase 2, he has the right to receive an offer in contractual phase 2. However, he/she will not lose his/her right by accepting an offer from the same firms in a different phase.

STAGE 7. Notification stage. Notification is provided to fired workers. In this stage, workers are notified of their having being fired and of their right to receive an offer.

On your screen a message will appear informing you whether you are a firm or a worker, so that you can carefully read the detailed instructions either for workers or firms.

The experiment will not commence until all participants are completely familiar with all the procedures. In order to secure that this is the case, we kindly ask you to make the exercises which will appear on your computer screen.

In addition we will conduct a training trial of the trading phase, so that you can get accustomed to the computer. This trial phase will not be added to the result of the experiment and therefore not remunerated. Following the trial phase we will begin the experiment, which will last 12 periods.

Procedures in detail: instructions for workers

Please read the following instructions carefully if you are a worker.

You are a worker for the entire experiment. The experiment lasts 12 periods. Each period is made up of 7 stages. In each period you can conclude only one contract. During the experiment you will enter your decisions into the computer. We describe after in detail how you can make your decisions in each stage of the game.

STAGE 1. The first contractual phase. Each period starts with a contractual phase. During the contractual phase each worker can enter into an agreement with one firm. In order to do so, firms can submit offers to the workers. As a worker you can accept one of the offers submitted to you in each period. During the contractual phase, on the top left corner of your screen you will see the current period of the experiment. In the top right corner of the screen you will see the time remaining in this contractual phase, displayed in seconds. The trading phase in each period lasts 150 seconds. In the top at the centre of the screen you will see your ID. When this time is over, the

contractual phase is over. Therefore no further offers can be submitted or accepted for this period.

As a worker you can accept the offers that firms have submitted to you. There are two types of offers which you can accept:

- **Private offers to you**: each firm has the opportunity to submit private offers to you. You alone will be informed of these offers and you alone can accept them. No other worker or firm is informed of these offers. If you receive private offers, they will appear on your screen, and in the column below the title "offer" you will see "private".

- **Public offers**: each firm has also the possibility of submitting public offers. All workers are informed of these offers and any worker can accept them. If a firm submits a public offer it will appear on your screen, and below the column below the title "offer" you will read "public ". However, a firm is able to exclude up to 4 workers from a public offer. As a worker, you will not see the public offer from which you have been excluded.

The offer of a firm - either public or private - must specify the salary offered and the level of effort required.

To accept an offer you have to select it and press the button "confirm". As soon as you have pressed the "confirm" button you will see a screen reporting the details of the offer you have selected: the salary you will be paid and the ID of your opponent firm. At the same time, the firm will be notified that you have accepted the offer and will not be able to submit any further offers

In some circumstances, you have the right to get an offer from a firm.

- **Compulsory offers to you**: if you have worked with the same firm for two or more consecutive periods, and as long as you have a positive right to get an offer, on the bottom of your screen a new box will appear where you will receive a

"compulsory offer" from that firm. In this case the wage offered by the firm must be at least as high as in your last period. Under this box, you can also see the level of your right to get an offer and whether the firm has fired you or not. You may either "accept" or "reject" that offer, by pressing the relative button. Once the firm has submitted to you a compulsory offer, you have to reach a decision in 15 seconds, otherwise the offer will disappear. As long as you have not decided yet, and the 15 seconds have not elapsed yet, "your" firm cannot make another offer to you or to another worker. However, you can still receive other offers from different firms. This means that you can accept the offer of "your" firm as long as you have not declined it (and time has not elapsed yet) or accept other offers. Your firm will be informed about your decision. If you reject the offer or if you accept another firm's offer, "your" firm is free to make offers to other workers and your right to get an offer from that firm will be set to zero. However, if in the same stage you rejected the compulsory offer, you accepted another offer from the same firm, your right to get an offer will be kept. The same will happen if you accept the compulsory offer of "your" firm. In both cases, if you have been fired your right to get an offer will decrease by 1. Otherwise, if you have not been fired, also this period will add up to your right to get an offer. Only if you reject the compulsory offer or if you accept the offer of another firm, your right to get an offer expires. This means that the right to get an offer can only be relinquished by you, because you reject the compulsory offer by pressing the "reject" button, you do not accept it in 15 seconds or you accept another offer from a different firm.

Each worker can conclude only one contract in each period. Once you have accepted one offer you cannot accept any further offer.

All firms have to comply with the following rules when submitting trade offers:

The wage offered by the firm may not be lower than 0 or higher than 100:

$$0 \leq offered\ wage \leq 100$$

Moreover, in compulsory offers, the wage offered may not be lower than the wage offered in the previous period:

$$previous\ wage \leq offered\ wage \leq 100$$

The effort required by the firm may not be lower than 1 or higher than 10:

$$1 \leq desired\ effort \leq 10$$

You have not to worry about these constraints since the computer will check entries from every participant.

As long as no offer has been accepted by a worker, the firm can make as many public and private offers as it wishes. Each offer submitted by a firm can be accepted at any time during the trading phase. Once all firms have concluded a contract or 150 seconds have elapsed, the contractual phase is over.

STAGE 2. Decision to hire a second worker. In this stage firms are asked if they want to hire another worker. As a worker you will not enter this stage.

STAGE 3. The second contractual phase. This stage is the same as STAGE 1. During this phase workers who have not concluded any contract in the first contractual phase can enter into an agreement with one firm. You will enter this stage only if you did not reach any contract in STAGE 1, and there is a firm willing to hire a second worker or has to submit a compulsory offer to you.

STAGE 4. Choosing the level of effort. Following the contractual phases, you will enter this stage only if you are a worker who has concluded a contract in the first or second contractual

phase. On the screen, you will see the ID of your opponent firm, the wage you will receive from that firm, as well as the level of effort you are required to supply. However, you are not obliged to supply the desired level of effort required by the firm. You can provide any level of effort ranging from 1 to 10.

$$1 \leq actual\ level\ of\ effort \leq 10 \tag{1}$$

To confirm your choice press the "ok" button. As long as you have not pressed "ok" you can change your choice. Once you have pressed the "ok" button, your level of effort is determined and you will leave this stage.

STAGE 5. Your income. If you have not concluded any contract during a trading phase, you will not gain an income for this period. Your profit will be zero.

If you reached a contract, either in the first or the second contractual phase, your income depends on the wage you accepted and the level of effort you decided to deliver. Your income will be calculated as follows:

your income = wage - cost of effort

The higher the level of the effort chosen, the higher the cost of your effort. The costs for each level of effort are displayed in the subsequent table:

EFFORT	1	2	3	4	5	6	7	8	9	10
COST OF EFFORT	0	1	2	4	6	8	10	12	15	18

Therefore the higher your income, the lower your level of effort. Furthermore, the higher your income, the higher is the wage offered by the firm.

No firm will know the workers' real income and effort with certainty. The firms know how much cost is needed for a worker to deliver a precise level of effort. This means that the firms

know the "effort table". However, your income and effort will not be displayed to the firms. Moreover, firms cannot infer from their income the level of effort you have chosen - with certainty - as there is a 10% given chance that firms will be hit by a negative shock. If in a certain a firm records lower profits, it may be either due to a negative shock or to a low level of effort made by its workers.

The income of your firm: on the contrary, workers can observe the level of firm profits. In particular, as a worker, in each period you will see the profit earned by your opponent firm.

If a firm does not hire any worker it will get 0 points for that period.

If a firm hire a worker, its income depends on the wage offered and the level of effort made supplied by this worker. The income of your firm will be calculated as follows:

- if it has hired only one worker:

Firm income = 10* your level of effort - your wage - shock

- if it has hired two workers:

Firm income = 8* your level of effort + 8*effort 2nd worker - your wage - 2nd wage - shock

where by shock we mean the negative shock, equal to 15 points, and the probability of an adverse shock is equal to 10

As you can see from the above mentioned formula the higher the income of your firm, the higher the level of effort actually supplied by you and the other worker and the lower the wages.

Please note that workers and firms can suffer losses in each period. These losses have to be paid from your initial sum of money or from earnings in other periods.

You will be informed of your income on an "income screen". On this screen the following will be displayed: - the firm with which you traded; - your wage; - the level of effort required by

your firm; - the level of effort supplied by you; - the income of your buyer in this period; - your income in this period.

STAGE 6. Firing stage. As a worker you will not enter this stage. At the end of each period, if a firm has hired some workers for two or more consecutive periods - hence the worker has the right to get an offer - it is asked whether and which workers it wants to fire. This period lasts 20 seconds.

STAGE 7. Firing notification. Notification will be provided to fired workers are notified. In this stage, workers are told whether they have been fired in this period or in the previous ones, as long as their right to receive an offer is greater or equal to zero. This period lasts 10 seconds.

EXERCISES

Please solve the following problems. Should you have any questions, please ask the researcher in charge of the experiment. Wrong answers have no consequences whatsoever.

Problem 1: A contract envisages a wage equal to 60 and a desired level of effort equal to 9. The worker chose a real effort equal to 9. Which is the income of the worker? - 45

- 50

- 45 with no shock, and 30 if a shock occurs

Which is the income of the firm with only one worker?

- 30

- 45

- 30 with no shock, and 15 if a shock occurs

Problem 2:

A contract envisages a wage equal to 50 and a desired level of effort equal to 8. The worker chose a real effort equal to 7. Which is the worker's income?

- 38

- 40

- 38 with no shock, and 23 if a shock occurs

Which is the income of the firm with only one worker?

- 20

- 30

- 20 with no shock, and 5 if a shock occurs

- with no shock, and 15 if a shock occurs

Problem 3: Let us assume that the worker accepted a private offer from a particular firm in period 5. In period 6 the worker accepted a public offer coming from the same firm. Do the worker enjoy the right to get an offer starting from period 7?

- Yes

- No

If so, it is equal to

- 0

- 1

- 2

Problem 4: Let us assume there is a worker with a current right to get an offer equal to 3 who accepted a compulsory offer from the firm during the same period.

In that case, what happens to the right to get an offer if the worker were fired by this firm? - Decrease by 1

- Increase by 1

What happens if the worker were not fired? - Decrease by 1

- Increase by 1

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